SEP 19 1942

Industrial Arts and VOCATIONAL EDUCATION

HOW AND WHY
WILLIAMS' TOOLS AID WAR PRODUCTION

J. H. WILLIAMS & CO., *Drc. Forgings and Drop-Forged Tools*, BUFFALO, N. Y.

WILLIAMS' "SUPERSOCKET" WRENCHES

Since *socket wrenches*, today, play an important part in the servicing as well as manufacture of mechanized war equipment, a general knowledge of standardized types is desirable. Williams' "Supersocket" Wrenches include 5 separate and distinct patterns of *standard drive* sockets, each with its full assortment of handles and parts. A brief description of each pattern follows, together with information on the type of service for which it is designed.

Midget Pattern

1/4" Square Drive.
Openings, 3/16" to 7/16"

12-point *Hex* *Square*

Slim, straight wall sockets for electrical and all delicate adjustments. Ideal for magnetos, timers, generators, wiring connections, radios, carburetors, etc.

Bantam Pattern

3/8" Square Drive.
Openings, 1/4" to 3/4"

12-point Regular *8-point Extra Deep* *12-point Extra Deep* *12-point Universal*

Light, but strong, straight wall sockets with thin walls for use in close quarters. Universal sockets are fitted with spring tension to maintain desired operating angle. Recommended for aviation and general service.

Standard Pattern

1/2" Square Drive.
Openings, 7/16" to 1-1/4"

12-point Regular *12-point Extra Deep* *Square Regular*

The 12-point sockets in this pattern have straight, thin walls. Those with square openings are the Taper Nose type. Extra Deep sockets have cross hole for use with a bar. Recommended for industrial and general service.

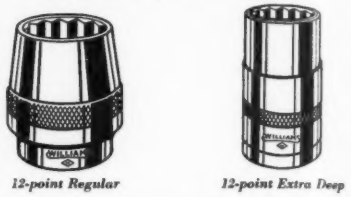
TYPICAL HANDLES & PARTS

(Standard Pattern Illustrated)

S10 & S15: Speeder Handles
S110P & S115P: Extensions
S50: Ratchet Handle
S57: Torque "Measurrench"
S51: Reversible Ratchet Handle
S40, S41 & S42: Flex Handles
S20A: Sliding T Handle
SH130: Adapter. S140: Univ. Joint

Heavy Duty Pattern

3/4" Square Drive.
Openings, 7/8" to 2-1/4"



12-point Regular *12-point Extra Deep*

Designed for harder service where more strength is required than on the "every-day" job, this pattern provides ample strength without clumsy bulk.

Extra Heavy Duty Pattern

1" Square Drive.
Openings, 1-1/16" to 2-3/4"

12-point Regular

Ruggedly designed for the toughest kind of service. Sockets are all cross-drilled to receive sliding handle, which minimizes tendency of socket to "tip" under extreme leverage. "Lock-Socket" device eliminates danger of sockets being detached in service. Ideal for all extremely heavy work including tanks and other mechanical field equipment.

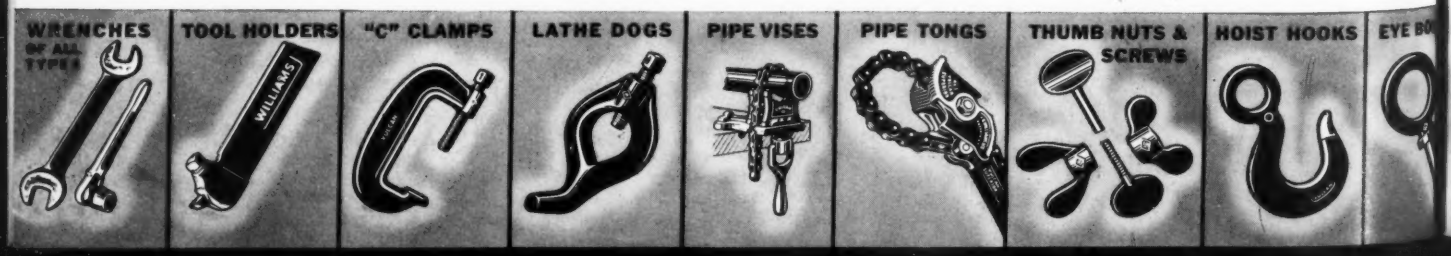
General Characteristics

Speed and *Safety* are inherent socket wrench advantages. "Supersockets", with their innumerable combinations of handles, accessories and drive adapters, provide an extremely flexible wrench system that is speeding war production and the servicing of fighting equipment for land, sea and air.

Williams' "Supersockets" are sold singly and in complete Sets. Write for booklet, "How to Select and Use Wrenches."

WILLIAMS
SUPERIOR DROP-FORGED TOOLS
Headquarters
for over half a century for
DROP-FORGINGS and DROP-FORGED TOOLS

Sold by Leading Industrial Distributors Everywhere



INDUSTRIAL ARTS and VOCATIONAL EDUCATION

VOL. 31 OCTOBER, 1942 Number 8

IN THIS ISSUE

This is the Annual Projects Number and it is hoped it will be found very helpful by the teachers of industrial arts and vocational education.

One of the projects offered can be used very well in the drafting room, the pattern-making shop, and the machine shop. Eight of the projects are for the metalworking shop, 17 for the woodworking shop, one for the print shop, and several others can be profitably used in the general shop, or as special jobs in other school shops.

Besides the foregoing, there is an excellent article on the training of industrial-arts teachers for the present emergency, and a similiarly timely, well-written dissertation on the demonstration.

The tribute to Josef Sandberg will, no doubt, be welcomed by all those interested in the history of industrial education.

THIS MONTH'S COVER

The cut for the October issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION was made from an official photograph from the Office of War Information, showing an American tank and an American half-track scout car, both of which will do their part in winning a decisive victory over the Axis.

For Victory

BUY U. S. BONDS AND STAMPS

CONTENTS

Intensive Training to Provide Industrial-Arts Teachers During the War, *G. H. Silvius*..... 321
The Demonstration, *Ray Karnes*..... 323
Foreman Training, *E. H. Rueter*..... 326
Individual Interest Ballot in the Drafting Room, *Frank P. Darby*..... 327
Josef Sandberg — Pioneer, *Vincent P. Conners*..... 328
Editorials..... 329
Pointers for the New Teacher, *Albert E. Jochen*..... 330

Problems and Projects

Two Cylinder Air Compressor, *Frank E. Anthony*..... 331
Wrought-Iron Smoking Stand, *Clyde R. Sutfin*..... 331
Novelties Made From a Table Leg, *Hazel F. Showalter*..... 332
Gourds As Material for Handicraft, *Hazel F. Showalter*..... 332
Old Well Lamp, *Roland M. Bacon*..... 334
Glass-Top Table, *John F. Shay*..... 334
Wrought-Iron Coffee Table, *Clyde R. Sutfin*..... 335
Ornamental Metal Belts, *Kenneth R. Kuemmerlein*..... 336
Lawn Chair, *Roy E. Vile*..... 337
Industrial Arts Goes Into the Home, *David R. Winegarden*..... 337
Pewter Napkin Rings, *V. A. Johnson*..... 339
Whittling-Jackknife Technique, *W. Ben. Hunt*..... 340
Nautical Style Bookstall, *Lawrence G. Lindahl*..... 341
Toolmaker's Clamp, *Earl G. Darby*..... 343
Flowerpot Holder, *R. A. Tomkiewicz*..... 344
Four Utility Economy Desks, *James McGregor*..... 344
Modern Projects, *Emerson Wm. Manzer*..... 346
To Cut Curved Edges, *P. S. Burns*..... 351
Horn As a Handicraft Medium, *C. Glen Coolman* and *H. C. Letsinger*..... 352
Shopwork and Nature Study, *George A. Smith*..... 353
Gas Blowtorch, *C. W. Blakeslee*..... 353
Celluloid Etching, *Albert Kosloff*..... 354
Carve a Horse, *Homer C. Rose*..... 356
Conserving Finishes and Paints, *Homer C. Rose*..... 358
Meter-Reading Aids, *Einar E. Siro*..... 358
Conserving Welding Electrodes, *Clayton B. Herrick*..... 359
Corner Clamp Rack, *Cecil Ford*..... 361
Graphic Arts Progress, *R. Randolph Karch*..... 361
An Adaptable Shelf Design, *Delmar W. Olson* and *Fred Eberle*..... 361
Design for the Teacher of Industrial Arts, *Burl N. Osburn*..... 362
Test Jack for Testing Welds, *A. F. Davis*..... 29A

Personal News 20A
Association News 23A
Questions and Answers 24A
News Notes 29A
Shop Equipment News 30A
New Publications 35A

Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

Entered January 2, 1914, as Second-Class Mail Matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright 1942, by The Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office. November 25, 1930. Published monthly except during July and August.

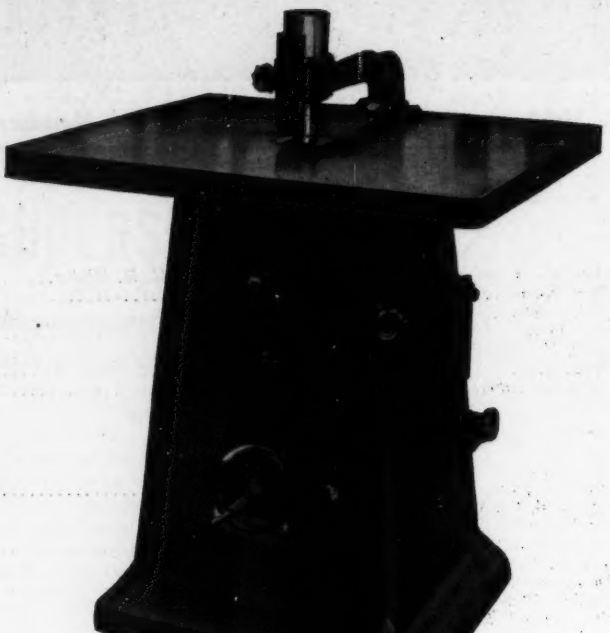
Subscription Information. — Subscription price, $2.50 per year, payable in advance. Canadian postage, 50 cents; Foreign Countries, 50 cents. Copies not over three months old, 35 cents; more than three months, 50 cents. Notice for discontinuance of subscriptions must reach Publication Office in Milwaukee at least fifteen days before date of expiration. Changes of address should invariably include old as well as new address. Complaint of nonreceipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for at regular space rates. In all cases manuscripts should be accompanied by full return postage.

PUBLISHED MONTHLY, EXCEPT DURING JULY AND AUGUST, BY THE BRUCE PUBLISHING COMPANY, 540 NORTH MILWAUKEE STREET, MILWAUKEE, WISCONSIN

Eastern Office: 330 W. 42nd St., New York, N. Y. — Western Office: 66 E. South Water St., Chicago, Ill.
Pacific Office: 1233 S. Hope St., Los Angeles, Calif.

SAFE • HEAVY • STRONG



J-50 SHAPER

VALIANT soldiers alone cannot win this war . . . machines are also important. To supply the skilled operators needed to run these machines, a gigantic vocational training program is now in operation. Employed in this program are countless Yates-American woodworking machines; for each day, the use of wood in the war effort is increasing . . . new and important discoveries have created a greater demand for it as a structural material.

This is a job for which Yates-American equipment is exceptionally well-suited. The machines are full-sized, industrial-type . . . have the strength and capacity needed for hard, continuous use. They are simple and safe to operate. Students require less supervision . . . instructors can handle larger classes.

The J-50 Shaper, illustrated, is a Yates-American machine which is used extensively in the school field, and was designed with a complete understanding of educational needs and requirements. It greatly simplifies the production of moulding and irregular contours . . . will take a considerable load without chattering or slowing down.

The heat-treated table is highly polished for easy feeding of stock . . . the strong spindle unit is mounted on gibbed ways . . . an endless fabric belt drive provides a spindle speed of 8500 R.P.M. (10,000 R.P.M. optional at no extra cost).

In addition to this shaper, a complete line of woodworking machines for vocational education is manufactured by this company. Write for information.

YATES-AMERICAN MACHINE COMPANY • BELOIT, WISCONSIN

Short Talks on Wood

EBONY (*Diospyros ebenum*)

A tropical tree which is closely related to the persimmon tree of this country. Both bear edible fruit. The wood is very heavy, hard and durable. Not likely to warp or shrink. Resists decay and attack by insects. Takes a fine polish.

Deep black in color, in fact, the word "ebony" is almost synonymous with blackness. Not all species yield a wood which is jet black throughout. Many are streaked, mottled or spotted with other colors. These are usually stained in finishing. The wood of *D. ebenum* is generally thought to excel all other species in fineness of grain and intensity of color.

Used considerably for cabinet work and inlays. Many small articles are made from it such as piano keys, violin bridges, flutes, knife handles, backs of brushes, walking sticks and mathematical instruments.

Ebony is widely distributed in tropical parts of the world, but the best quality is obtained from this particular species which grows in greatest abundance throughout the flat country west of Trincomalee in Ceylon. Other species are found in India, Africa and the East Indies.

Not a great deal is known about the tree as it grows in its native habitat. The black color of the wood once gave rise to the belief that the tree was never seen exposed to the sun, but this of course was unfounded. The tree is said to have a somewhat narrow trunk, and black, charred-looking bark.

To date, thirty-eight brief articles similar to the one above and dealing with the more commonly used woods have appeared in these ads. As in the past, we continue to invite your suggestions as to the species of wood you would like featured in this series.

YATES-AMERICAN

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

Intensive Training to Provide Industrial-Arts Teachers During the War

G. H. SILVIUS*

The industrial education department at Wayne University organized a program during the second semester of this school year to give intensive teacher training in industrial arts. The purpose of this program is to provide teachers for our shops and drafting rooms during the war. There are 40 people enrolled in the program at the present time, and plans have been made to carry the program forward during the war.

The Trainees

The people taking this work range in age from young men and women finishing college, to people 60 years of age. Some are married women, not now employed, who hold Michigan teacher's certificates, in some other field of education. A few are men who have become unemployed because the work they were doing was closed out with the war effort. A few of these were former school teachers. It is required that candidates for this course be college graduates, who have some interest and aptitude for manipulative work, and have been successful at the work they were doing. Several teachers of other subjects in the Detroit area have volunteered to take conversion training in the late afternoon, evening, and on Saturday, so that they could be transferred to the vocational department during the war. The trainees have been very carefully selected by interviewing a large number of candidates.

*Assistant Professor and Assistant Supervisor of Vocational Education, Wayne University, Detroit, Mich.

The Training Program

A special program is made for each individual in intensive training based on his or her needs. There are many reasons why this is necessary. First, each person is given teacher training for a specific teaching position such as: Drafting in the intermediate school, general industrial arts in the elementary schools, and general metal in the intermediate school. This means that they will not be transferable within the vocational department from one type of a teaching position to another as is possible with the regular teachers. Second, it is obvious that some individuals will need considerable help with the methods, and techniques used in teaching a specific shop subject. Others will need to work with tools so they can develop the necessary degree of skill. It is advisable for some people to observe a master teacher teach the subject for which they are preparing. Everyone needs to spend a short period of time teaching under the direct supervision of a master teacher.

The Period of Training

People are assigned to schools as rapidly as they are needed after they have demonstrated their ability to do the work. Some spend considerable more time in the initial training period than others. Everyone continues on with the training after being assigned to a teaching position by attending classes that are held in the evening and on Saturday. The supervising teachers giving the initial training visit the shops and drawing classes to which these people

Fig. 1. Mr. Gardner teaches an evening class in household mechanics

Fig. 2. Mr. Mitchell, a science teacher, is now teaching household mechanics

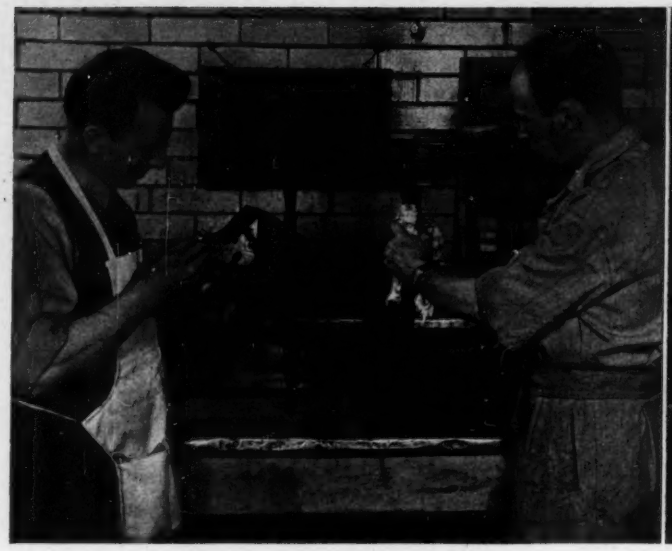


Fig. 3. Mr. Olah and Mr. Scrimgeour are now teaching industrial arts

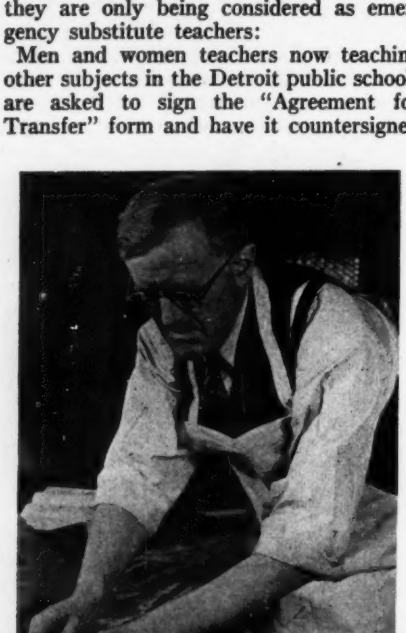
Fig. 4. Mr. Scrimgeour was in business before he took the training

are assigned so that they can provide an opportunity for the necessary help. In general, the people that are placed will be encouraged to continue taking courses during the period of time that they will work as substitute teachers.

Protection of Regular Teachers on Leave

Everyone not now employed by the board of education is asked to sign the following application. It is understood that they are only being considered as emergency substitute teachers:

Men and women teachers now teaching other subjects in the Detroit public schools are asked to sign the "Agreement for Transfer" form and have it countersigned



Mr. McMullen, a commercial artist, is now teaching industrial arts

APPLICATION FOR INTENSIVE TRAINING IN INDUSTRIAL EDUCATION

Date .....

I am interested in taking the intensive teacher training in ..... so that I might become an emergency substitute teacher in the vocational education department during the war.

I understand that people taking the intensive training will be assigned to schools when they have demonstrated their ability to do the work and as rapidly as they are needed.

It is also understood that if I am placed that I would be taking the place of one of the regular industrial-education teachers who is on leave during the war.

Signed .....

AGREEMENT FOR TRANSFER

Name ..... Date .....

School ..... Subject .....

I am interested in taking the intensive teacher training in ..... so that I might be transferred to the vocational education department during the war. I am doing this with the thought that I am making a contribution to the war effort.

It is understood that I am to be transferred back to the ..... department upon my request or when my services are no longer needed in the vocational education department.

Signed .....
Approved by
Department Head
Releasing Teacher .....

by the head of the instructional department releasing the teacher. In this way the individual that is willing to help teach shopwork is protected as well as the vocational department.

Special certification must also be secured for these individuals, which, of course, is an added protection to the regular teachers on leave. However, it is possible for people to secure college credit for this work and it is only possible for them to be considered for the regular teaching position after they have completed enough work to become legally qualified.

Shortage of Industrial Education Teachers

The acute shortage of industrial-education teachers is due to having many of our professionally trained men called to head educational programs in trade work for the armed forces. Several others have been loaned for key positions in industry. Many regular teachers are on leave to direct and supervise various vocational-education programs for war training. Several men have been taken in the draft.

Mr. Sobel, Mr. Cathcart, and Mr. Mitchell are Detroit Public School teachers that have been transferred to the vocational department during the war

The Demonstration*

RAY KARNES**

The well-planned and well-executed demonstration is one of the most effective methods of instruction that can be used in teaching basic technical subjects in the Armored Force School. The effectiveness of this technique of teaching can be explained in terms of the manner in which learning occurs. The most effective learning transpires in those situations that bring into play several of the senses. It has been established that we tend to learn readily in the situations that make use of the sense of sight. Learning takes place best in and during activity. The learner, while responding to the many stimuli present in the demonstration situation is much more active and gains far more experience than while responding to the rather narrow range of stimuli in the lecture situation.

The demonstration, together with the practical work that follows, or the application of the things demonstrated, brings into play several of the senses, places emphasis upon the sense of sight, and involves a significant amount of student activity or participation.

When Can the Demonstration Be Used Effectively?

The demonstration is rarely used exclusively in teaching all lessons of a course. It should be considered a technique to be used in combination with other techniques in presenting various kinds of subject matter. Naturally, the elements of the situation should be considered in determining the method or combination of methods that would be best for the presentation of a given lesson.

There are several factors that should govern the selection of a method or combination of methods to be used in teaching a given lesson. These factors are: (1) the objective of the particular lesson, (2) the peculiar abilities and limitations of the instructor, (3) the learners, their abilities, background of experience and training, (4) the nature of the subject matter to be presented, (5) the time limitations, and (6) the equipment and supplies available. One will find that consideration of these factors will point to the demonstration as a technique to be used frequently in presenting subject matter of technical nature. The types of subject matter taught in the Armored Force School that can be presented effectively by the demonstration technique are as follows:

1. *Basic manipulative operations involved in technical work.* The instructor follows a practical and economical procedure for teaching students how to perform a manipulative operation when he *explains*, step by step, how the operation must be performed and at the same time *shows* how it must be done by performing carefully and precisely each of the manipulative steps involved. He then supervises the students as they perform the operation, making sure that all follow the technique demonstrated and that a minimum number of errors occur.

The demonstration is recognized as the most effective method for teaching students to perform manipulative operations.

2. *Principles and theories involved in technical fields of endeavor.* An understanding of certain basic principles is considered essential to the successful performance of the work involved in most technical fields. The demonstration can be used to aid in the development of this understanding. For instance, in activities that make use of electricity, any number of elementary demonstrations can be given to teach the theory of the flow of electrical current, magnetism, and so on. The demonstration is relied upon rather consistently to teach the basic principles of mechanics.

3. *The operation or functioning of mechanical units or pieces of equipment.* When teaching the construction, operation, or functioning of a piece of equipment, it becomes essential that the learners have an opportunity to *see* how the piece is constructed and how it operates. The competent instructor makes effective use of the demonstration in teaching this type of information. He *explains* and *shows* the construction and operation of the unit in such a manner that the student is enabled to gain accurate and lasting impressions. In teaching the functioning of the machine gun, the instructor demonstrates how it operates by using a cutaway model that reveals the movement and relationship of the various parts. The students thus have an opportunity to see how it functions.

4. *Tactical movements and functioning of groups of individuals or units in combat.* In tactical training the demonstration is used as an effective means of teaching men *how* to execute movements and carry out assignments.

Specific Points to Be Observed in Planning and Giving a Demonstration

There are many points that must be considered in planning and giving an effective demonstration. The physical setup for a demonstration requires special attention. Whereas the lecture and conference may be conducted in a formal classroom with little or no changes in the physical arrangement, the demonstration makes it necessary to arrange for the use of equipment, tools, materials, and so on. If students are to perform each manipulative step of the operation immediately following the instructor's demonstration of the step, arrangements must be made for directing the practical work during the demonstration. In any event, plans for the application of the thing to be demonstrated must be considered in connection with the demonstration itself.

The instructor must command much teaching skill in order to give a really effective demonstration.

Although the following statements explain in specific terms the points that should be observed in planning and giving a demonstration that has as its purpose the teaching of *manipulative operations*, many of them also apply directly to the demonstration as used to teach technical information topics.

1. *Plan very carefully the details of the demonstration.* Careful planning, as is true with all other methods of teaching, is absolutely essential to the performance of an effective demonstration. A general statement, however, to the effect that careful preparation and planning are essential is of little benefit. Several of the following points indicate specifically the things that must be considered in planning for the demonstration.

2. *Arrange all necessary tools and equipment in such a manner as to make them readily accessible to the instructor.* For instance, if a series of wrenches and other small tools are to be used they should be arranged neatly in the order that they will be used. All pieces of equipment should be conveniently located so that they can be brought into play as needed without awkward gaps or loss of valuable time. In the event that certain pieces of equipment, because of their distracting influence, are not to be brought before the class until needed, they should be arranged so that they can be moved quickly and without causing too much noise and distraction.

3. *Arrange students so that all can see and hear.* Too often instructors neglect the small physical details in the teaching situation. The demonstration places a premium on the sense of sight. Check to make sure that students are situated so that all can see plainly every detail of the demonstration. The seating arrangement in many classrooms is such that students in the back rows or those near the extreme ends of the front rows are handicapped. The nature of many short demonstrations performed with small pieces of equipment make it necessary that students stand in a semicircle about the instructor. The size of the class, the size of the equipment to be used, and the length of the demonstra-

*This is the first of a series of articles on presentation of lessons by staff members of the Teacher Training Department, Armored Force School, Fort Knox, Ky. Lt. Col. Verne C. Fryklund is the director of this department, and Brig. Gen. S. G. Henry, commandant.

Trade analysis and human relations were taught in the school prior to teaching the content of these articles. The articles will not appear in sequence. Certain details referring to the military have been deleted.

**Teacher Training Department, Armored Force School, Fort Knox, Ky.

tion are factors to be considered in arranging or placing the students.

The instructor should check frequently to make sure that all students can hear. This is extremely important in working with large classes. Many demonstrations make it necessary that engines and other pieces of equipment be operated for short periods of time. Unless the instructor can raise his voice above the unavoidable noises that enter into demonstrations, he should discontinue his remarks until the noises have subsided. Very poor teaching results from conditions that enable only a few members of the class to hear the instructor.

4. *Follow a written lesson plan.* The preparation and use of lesson plans are essential to effective teaching regardless of the method of instruction to be used. The use of these plans becomes of particular importance to the teaching of manipulative operations by the demonstration technique. Teaching a basic operation involves the development of exact habits. In order to develop these habits in the shortest length of time, the instructor must demonstrate a definite, step-by-step procedure for performing the operation. He must plan very carefully the accepted technique for performing the operation, and, in addition, plan his procedure for teaching the operation. This plan should be followed consistently. Unless this plan is prepared and followed, the instructor will not be able to teach the same procedure to two similar classes. Two instructors teaching the same operations to similar classes will not teach exactly the same technique unless they plan specifically to do so.

The instructor should use the lesson plan: (1) to guide his study and preparation for the demonstration, (2) to check the physical setup for the demonstration prior to the time the class assembles, and (3) as a guide in the actual presentation of the demonstration. The extent to which an instructor should use or refer to the plan while giving the demonstration depends on his familiarity with his subject, the complexity of the operation being taught, the length of the demonstration, and so on. He should have the plan available for ready reference and refer to it as often as is necessary to make sure that he is following it in detail.

The lesson plan is of particular value to the instructor in giving a summary of the demonstration. While actually performing the operation, he may be able to follow the plan consistently without making reference to it. One step suggests the next as he proceeds. In giving the summary, however, especially if the operation involves a large number of steps, he will experience difficulty in enumerating all of the steps and in keeping them in exactly the same order that they were performed. Actual observations of competent, experienced instructors reveal the fact that, unless outlines are used, important manipulative steps are frequently left out of the summaries that follow their demonstrations and that the order of certain steps is often reversed in the summaries.

5. *Maintain the proper position at all times.* The instructor must stand in such a position that all students can see the details of each manipulative step as he performs it. If working with a large piece of equipment he must stand to one side. If working with smaller units, he can assume a position behind the bench or table upon which the unit is placed. Occasionally the instructor will find it impossible to arrange for all of the students to see at one time the performance of a particular manipulative step. He must change his position and repeat such steps for the members of the class that were not able to see the first time. Such pieces of equipment as the 37mm. gun and heavy engines are mounted on stands for instructional purposes. The instructor must take full advantage of this and turn the piece from right to left and expose his work to the view of all members of the class.

In demonstrating manipulative operations that involve a series of complex movements of first one hand and then the other, the instructor often finds it necessary to turn his back partially toward the class with hands extended to his right or left. In teaching men to tie complex knots this technique can be used so that students can follow the instructor without having to transpose mentally each of the movements made by the instructor. The fact that the instructor faces the students while making certain adjustments accounts for certain errors that students make. One common error of this type is the making of adjustments or the execution of movements to the right that should have been made to the left or vice versa. Left-handed and physically handicapped instructors must be particularly careful and make sure that all movements are made clear to students.

6. *Talk to the class and not to the tools, visual aids, or the blackboard.* Both experienced and beginning instructors violate this rule frequently. The instructor must remain attentive to the operation being demonstrated and at the same time address the class. Even though certain phases of the operation may require concentrated attention, the instructor can maintain contact with the students by glancing occasionally in the direction of the class and by continuing his explanation in a tone that indicates that he is addressing the students instead of the equipment.

7. *Demonstrate only one operation at a time.* This does not mean that only one operation should be taught during a given instructional period. In the Armored Force School several operations may be demonstrated during an instructional period, but the demonstration of the first operation to be taught should be completed before beginning the second. The students should recognize distinct breaks between the operations and at the same time realize that operations are combined in the performance of jobs.

8. *Demonstrate only one correct method at a time.* Many operations can be performed by using any one of several methods. When operations of this nature occur, it is essential that the individuals responsible for instruction determine what method should be taught and then make sure that all instructors in a given department teach this accepted method. If it becomes necessary for students to learn more than one method of performing a given operation, a *separate* and *distinct* demonstration should be given for each method to be taught. Confusion results when an effort is made to teach two methods with one demonstration. Of course, if two methods are the same except for slight differences in the manner in which one or two manipulative steps are performed, these minor differences can be presented in one demonstration. If, however, major differences exist, a separate demonstration must be given.

9. *Show how and explain how at the same time.* Instructors become concerned with the question of how much talking or explanation should accompany the actual performance of the operation. Immediately preceding the performance of a given step in the operation the competent instructor tells exactly what he is going to do next. While he is performing the step, he explains how he is proceeding and indicates, in many instances, why the step must be executed in a certain established manner. The instructor should time his explanations in such a manner that only a few seconds lapse between each of his remarks. If the completion of a certain manipulative step involves a minute or two of manual work but requires little or no explanation, a summary of the steps previously completed can be given during this interval.

10. *Omit unnecessary information.* Information presented during the demonstration should include only those highly specific points that are auxiliary in nature. These specific points should be taught at the same time that the instructor is demonstrating the step in which the points are involved. For instance, while teaching how to adjust or set the gap on a spark plug, he would emphasize the fact that the negative rather than the positive electrode must be adjusted, and, in a brief statement, give the reasons why. He would also give the proper distance between the electrodes on the particular plug with which he is working. He should not, however, attempt to teach an *information topic*, such as the types, sizes, and construction of spark plugs, while giving the demonstration. Information topics should be taught as distinct instructional units. The information to be presented during the demonstration given to teach students how to perform an operation should be confined to safety precautions and to the specific points that teach students *how* to perform the manipulative steps and *why* they must be performed in a particular manner, together with specific bits of information that make direct application and that are essential to the performance of the steps.

11. *Emphasize safety precautions.* Specific safety precautions constitute a part

of the auxiliary information that must be taught while giving a demonstration. An information topic covering the general safety precautions, rules, and regulations will usually be taught near the beginning of the training program. It is absolutely essential, however, that those highly specific safety precautions to be observed while performing the various manipulative steps of an operation be taught while these steps are being demonstrated. If the instructor attempts to teach at one time all of the specific safety precautions to be observed throughout the course, he will usually find that the list will be extremely long and that students will fail to observe them unless they are stressed again while demonstrating the steps to which they apply.

12. *Use visual aids to the greatest advantage.* Although the demonstration of an operation necessarily involves the use of pieces of equipment, tools, or concrete materials that are visible to the student, it is often necessary to use especially prepared visual aids to convey complete understanding of the operation. When fine adjustments are to be made on small pieces of equipment, aids become valuable in explaining and showing exactly how the adjustment is made. For instance, when demonstrating how to adjust the level of the float in a carburetor, no more than a few students near the front of the class will be able to see the details. In bringing out certain points, a large sectioned drawing of the carburetor can be used to greater advantage than can the carburetor itself.

Many operations are concerned with the movement or adjustment of parts that are concealed by housings, coverings, and so on. Visual aids can be used effectively to explain specific steps in these operations. For example, when teaching students how to adjust the depth of mesh of the cam and lever type steering gear, it is extremely difficult to explain how the adjustment is made without making use of visual aids. The contact points and other parts are not visible to the students. By displaying a large phantom drawing that shows the lever in contact with the cam, the instructor can explain readily how the two units are adjusted so as to produce the proper amount of drag or tension as the steering shaft is revolved through top center.

13. *Avoid and eliminate awkward gaps.* It is obvious that careful planning and arrangement of equipment are essential if the demonstration is to proceed smoothly. The interest and attention of the class are diverted when a delay occurs in bringing into play certain pieces of equipment. A potentially effective demonstration can be ruined if the instructor is forced to wait while an assistant procures a tool or device that has been overlooked in arranging the physical setting for the demonstration.

The instructor should check to make sure that every piece of equipment is in proper working condition before starting the demonstration. As a part of his preparation he should perform the operation to check his procedure and to assure himself that every instrument or piece of equipment will function properly. He cannot afford to have something "go wrong" while giving the demonstration before his class. Students lose confidence in the instructor who experiences difficulty at several points during the demonstration. Awkward blunders result in embarrassment for the instructor and serve as distracting influences for the students. The instructor's performance must run smoothly. It thus indicates that careful planning and preparation have been made.

In the event that an operation contains a particularly difficult step that is likely to cause the instructor a measure of difficulty, he should, before starting to perform the step, tell the students that the step is a difficult one and that it must be observed closely. To explain to students that a certain step is very difficult is not too convincing if the explanation occurs *after* the instructor has failed to perform the step as smoothly and easily as he performed the preceding ones. The instructor should never try to cover up a mistake or poorly demonstrated step in this manner. If a mistake is made, the instructor should correct it without halting to make excuses. The excuses merely serve to emphasize the error.

14. *Use assistants to the greatest advantage.* Many awkward and embarrassing gaps that occur while giving a demonstration can be eliminated by making effective use of assistants. However, assistants should not take part in the demonstration *unless their participation actually contributes* to the effectiveness of the instruction. Assistants should be trained to time their movements with the instructor's explanations. They should recognize their cues and perform their functions without the instructor having to stop and explain to them what to do and how to do it. The assistants should work quietly and efficiently. Their presence should not be distracting but should contribute in a positive manner to the demonstration.

15. *Check frequently to make sure that all students understand.* The instructor can do this by making use of the questioning technique. In making preparation for the demonstration, the instructor should determine at what stages during his presentation effort will be made to evaluate the students' understanding of the operation. There are strategic steps in most operations that constitute logical checking levels. The competent instructor will recognize the steps that cause difficulty for students. There will be certain steps in operations that must be done accurately and precisely to avoid serious injury to the individual or the equipment or both. Immediately following the presentation or demonstration of these strategic steps, specific questions should be asked to make sure that the students understand exactly how the steps should be performed.

At any time during the demonstration the instructor may ask questions in order to get students to supply highly specific points of auxiliary information.

16. *Encourage students to ask questions.*

CHECK LIST FOR DEMONSTRATION

Instructor:_____ Department:_____ Subject:_____

Title of demonstration:_____

Date:_____ Name of observer:_____

Directions: Check each item in appropriate column. Insert notes between items.

	YES	TO LIMITED EXTENT	NO
1. Definite objective made known to student?			
2. Feeling of need and interest created?			
3. All necessary tools and equipment on hand?			
4. Necessary tools and equipment properly arranged?			
5. All students able to see?			
6. All students able to hear?			
7. Sufficient use made of visual aids?			
8. Visual aids used correctly?			
9. Instructor maintain proper position?			
10. Instructor talk to class, not tools, aids, etc.?			
11. Questions asked at proper checking points?			
12. Instructor invite questions?			
13. Students ask questions?			
14. Essential points given proper emphasis?			
15. One operation demonstrated at a time?			
16. Instructor display skill? Set high standards?			
17. Detailed steps taken in proper sequence?			
18. Surplus information omitted?			
19. Instructor stay on subject?			
20. Distracting noises prohibited?			
21. Distracting aids covered or stored?			

	YES	TO LIMITED EXTENT	NO
22. Subject covered completely?			
23. Operating steps stand out clearly?			
24. Opportunity for immediate application?			
25. "Show," "tell" how at the same time?			
26. Awkward gaps eliminated?			
27. Approved method given?			
28. Only one correct method given?			
29. Control of class maintained?			
30. Proper trade terms used?			
31. Safety precautions stressed?			
32. Demonstration proper length?			
33. Instructor follow written plan?			
34. Summary at end of demonstration?			
35. Operating steps stand out in summary?			
36. Students seem to understand?			

ADDITIONAL COMMENTS:

A. Favorable:_____

B. Unfavorable:_____

The instructor should invite students to ask questions at frequent intervals during the demonstration. After each significant manipulative step questions should be called for or recognized. Students should have the opportunity to ask questions as misunderstandings arise, and not have to wait until the end of a lengthy demonstration. They should not, however, be allowed to interrupt the demonstration of a given step. While completing the step, many of the questions that normally arise will be answered for them.

When a question is asked either by a student or by the instructor all students should hear both the question and the answer. Answers should be directed to the entire class. The instructor must avoid private conversations about certain points with individual students while class is in session.

17. *Emphasize the essential points of the operation.* Operations are made up of a series of manipulative steps. During the demonstration these steps must be made to stand out clearly. From the instructor's demonstration students should learn *what* to do first, second, and so on, and *how* to perform each of the steps. In many instances they must be taught *why* a certain step must be performed in a certain manner. Emphasis must be placed then upon the *what, how, why,* and upon specific safety precautions.

18. *Set high standards for students.* In order to teach operations effectively the instructor himself must be able to perform the operations skillfully. It is expected that instructors will be able to perform the operations so well that rarely will a student, while in the basic training program, be able to excell the instructor. The instructor must display much skill in performing the operation in order to teach the students the character of effective performance. Teaching students what constitutes effective performance is one of the most important phases of instruction.

The instructor's complete mastery of the operation is essential to the development of student respect for and confidence in his ability as a technician and as a teacher. It will often be necessary for the instructor to perform a given operation many times as a part of his preparation for the demonstration. Each operation to be demonstrated should be performed at least once to make sure that every step can be performed smoothly and efficiently.

19. *Present a summary at the close of each demonstration.* After completing the actual demonstration the instructor must always present a summary in which he enumerates and emphasizes the manipulative steps involved in the operation. When summarizing, the manipulative steps must be presented in exactly the same order that they occur in the operation. None should be omitted. Again it should be mentioned that the lesson plan can be used effectively while presenting the summary.

Manner in Which an Instructor Can Improve His Demonstrations

The instructor who sets out deliberately to improve his technique of presenting demonstrations must study carefully the specific points to be observed while planning and giving a demonstration. He must make every effort to determine what constitutes an effective demonstration in his particular field of work. He must study and exploit the features of his own demonstrations that seem to result in effective learning.

In order to bring about improvement, the instructor must continually evaluate his work. In this evaluation he must check himself against a large number of specific points. If he has adequate supervision, he should profit much from and take advantage of his supervisor's evaluation and criticism. He will not always be able to objectively evaluate his own work.

The check list that follows can be used by either the instructor himself or by his supervisor in evaluating demonstrations. It has been designed specifically for checking demonstrations and does not include the general items such as mannerisms, voice, and so on, that should be considered when observing any presentation.

Foreman Training

E. H. RUETER*

Webster defines a foreman as (*a*) "The chief man or leader; (*b*) one who superintends the rest." Whether or not we realize it, every one of us has a *chief man* or *leader* in every one of our classes. That leader may be an influence for good or for evil. He may appeal to the best or the worst in our students. He may be self-appointed and trained in mischief-making or he may be teacher-designated and trained to "superintend the rest."

The source of authority in the first type is, at its worst, ability as a troublemaker; at its best, merely a willingness to assist. The source of authority in the second type is special knowledge and the ability to superintend. The first type may come from the group because of some special ability which he possesses or thinks he possesses. This causes the group to look to him for leadership if none better is at hand.

The second type is teacher trained and teacher designated. Because of special training and skill the second type commands the respect of the group he supervises.

In our democratic way of living there has as yet appeared no substitute for trained leadership. In every field of endeavor today there is a crying need for trained leaders who appeal to the intellectual rather than the emotional type of behavior. Especially is it apparent in an industry engaged in vital war production where we have the emotional type of leader who brings about a stoppage of work that costs the individual worker a loss of $20 in a three-day strike in order to gain a slight hourly increase that would net him $18 more in wages over a period of a year. This happened in a large Cleveland, Ohio, factory a few months ago.

It is essential also that, in some manner, followers be trained to choose wisely the leaders they are to follow. A well-trained and competent group of foremen in a school shop offers opportunities for education in both leadership and followership that contribute toward democratic procedure.

A unit in foreman training may be included in either the junior or senior high school shop course. The foremen in a junior high shop will not assume as much of the responsibility as the foremen of the high school or vocational school. The younger students will require more supervision and checking than the foremen of more mature years. Likewise will the foremen of junior high school age need more detailed instruction before they are ready to assume their duties.

The specific type of organization and the scope of duties which will be most effective from an educational standpoint must be determined by the individual instructor. Conditions vary in every school shop. The number of pupils assigned to each class, the number of units in operation in the shop, the number of grade classifications and other factors must all be considered in working out a classroom organization.

An efficient organization, resulting from an effective foreman-training unit, offers several distinct advantages. A few of these are:

1. It gives pupils valuable leadership and followership experience.
2. It permits the inclusion of various activities in the same class.
3. It eases the problem of management

*West High School, Cleveland, Ohio.

where classes are of several grade classifications.

4. It is an aid in the handling of large classes.
5. It improves the opportunities for frequent testing.
6. It extends the opportunity for using information sheets, operation sheets, and job sheets.

Some instructors may choose to designate the members of the organization as superintendent, foreman, and assistant foreman; others may prefer to have a foreman, secretary or timekeeper, and toolroom or stockroom clerks. Whatever the terminology, each member of the organization must receive preliminary training before he can effectively fulfill his duties. A suggested outline for a unit on foreman training follows:

Unit on Foreman Training

Introduction

Industrial and School Organizations: Purpose, organizational structure, responsibilities, departments.

Analysis of the Foreman's Job

Responsibilities: to students, to school, to teacher.

Classification of duties:

1. Clerical: attendance, grade cards, progress charts, inventories, records.
2. Machinery: inspection, maintenance, clean up.
3. Good Housekeeping: floors, aisles, storage, lighting, ventilation.
4. Supervision: safe usage of tools, machines, equipment, materials.
5. Personnel: skill processes, discipline, physical condition.
6. Assist in Instruction: correct methods of handling tools and materials, complying with safety rules.
7. Assist in Maintaining Discipline: shop rules, deportment, attitudes.

Individual Interest Ballot In the Drafting Room

FRANK P. DARBY*

Teachers in their first-day talk to new classes generally include some reference to the course objectives. In particular they emphasize some of the personal traits and technical skills they hope pupils may acquire through their classwork. This is unquestionably effective but it can be made more so if the pupils are given a chance to respond with some expression of what they themselves hope to achieve in the course.

What is in the course that is interesting and valuable to them? Their answers may be given on a blank similar to the *Ballot* shown herewith. This is designed to secure and record pupils' objectives. It also suggests the variety of interests the class activities serve and forecasts the opportunities that will be eventually opened to those who become skilled craftsmen.

The information on each pupil's ballot is placed on his record card by the notation indicated. For example, the letters *a, e, g, X, B.S. S.W.* on the record card would indicate his first, second, and third choices in answer to Question 1, and his answers to Questions 2 and 3. This method makes the information

*North High School, Columbus, Ohio.

_____ _____ _____ _____ _____ _____ 19____
Last Name First Name H.R. Period Desk Date

Rank Mark (X) Grade any kind of_____ I am taking. (X)
( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )
Soph.,Jr.,Sr.,Grad. 10B 10A 11B 11A 12B 12A Kind_____

1. Why are you interested in the study of_____? Use the following ballot in your reply. Mark three choices.

My choices Mark (X) First	Second	Third	Possible Objectives of_____Class Members
			(a) Try_____as aid in deciding my vocation when I leave school.
			(b) To learn_____so I can work with my father in his business.
			(c) To serve my immediate needs in the design and construction of craftwork, etc.
			(d) Want to qualify for a position as _____when I leave school.
			(e) May take Architecture, Art, Aviation, or Engineering Course at College.
			(f) To learn_____, I may want to teach it some time in the future.
			(g) General culture, such as skill, neatness, ability to visualize, etc.
			(h) Am required to take an elective, must have the credit.

2. Do you belong or desire to belong to the_____Service Group? (They volunteer to do_____work, as it may be needed for use in the_____room or other departments of the school.) Mark (X) Yes ( ). No ( ).

3. Have you used_____in connection with any of the following social or hobby activities? Mark (X).
B.S. ( ) Boy Scouts S.C. ( ) School Club HO. ( ) Home or friends
C.C. ( ) Church Club S.W. ( ) School Work Hb. ( )_____Hobby

Semester ballot of individual interests

Choice (Percent) of 600 Students. First	Second	Third	Ballot Items "Objectives of Class Members"
8%	13%	23%	(a) Try out drawing as an aid in deciding my vocation when I leave school.
4%	2%	1%	(b) To learn drawing so I can work with my father in his business.
3%	8%	12%	(c) To serve my immediate needs in designing craft work, etc.
8%	13%	6%	(d) Want to qualify for a position as draftsman when I leave school.
44%	13%	10%	(e) May take Architecture, Art, Aviation, or Engineering Course at College.
1%	1%	2%	(f) To learn drawing, I may want to teach it some time in the future.
14%	27%	25%	(g) General culture, such as skill, neatness, ability to visualize, etc.
3%	3%	10%	(h) Am required to take an elective. Must have the credit.
15%	20%	11%	(i) Am interested but do not know now just how I will use it.

Choice Graph: First, Second, Third; 10 20 30 40%

Students in Drafting Service Group..... 33%
Students using drawing in social or hobby activities..... 82%

Chart of individual interests in drawing classes

convenient for use in selecting study material to suit individual needs, and similar guidance purposes.

Many pupils enjoy comparing their objectives with their fellows. To illustrate how to provide for a comparison in drawing classes, a *Chart of Individual Interests* accompanies this article. While this chart illustrates specifically the use of the *Ballot* in drawing classes it can, with slight modification, be used in any laboratory or shop class. Of course, the items *a*, *b*, *c*, etc., should include all the practical reasons pupils may have for enrolling in the course.

The value of the information just described is evident. Other important values also appear when the *ballot* is put into practical classroom use.

The ambition of pupils to elect courses of distinct vocational content, as indicated in Question 1, leads to the collection of live data to answer questions of vocational fitness and opportunity. The reaction to questions 2 and 3 often results in the organization of the more intimate type of school club and the pooling of hobby interests to freshly motivate and enrich the regular schoolwork.

Josef Sandberg — Pioneer

VINCENT P. CONNERS*

August 31, 1942, marked the end of an era for it brought to a close the active career of Josef Sandberg, who in 1890, as a youth of 18, came to Boston from Sweden to assist Mr. Gustav Larsson in establishing the first Sloyd School in America. Mr. Larsson's courage and foresight gave to Sloyd work in America an impetus which so increased in importance that its educational value was recognized as a vital factor in secondary schools. After his death, the work was ably carried on by Josef Sandberg, who had been his assistant throughout the years.

This article does not propose to give an adequate picture of Mr. Sandberg's accomplishments; rather would it intimate something of his ambition and courage, his faith in and devotion to his art, something of his greatness, and the profound gratitude that manual training in America owes to him for his sincere interest in a new art in a new land.

Every field has its outstanding men and women — its masters. In the field of manual arts, Josef Sandberg ranks as one of these.

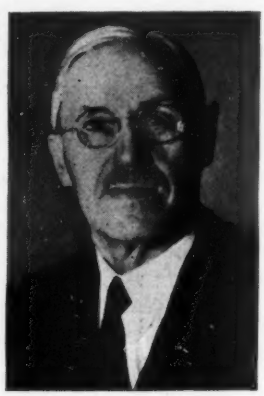
From the little town of Skara in central Sweden, Josef Sandberg came to America in 1890 to do pioneer work. He came in response to a request from Mr. Gustav Larsson who was at that time, through the generosity and foresight of Mrs. Quincy Agassiz Shaw, working in Boston to establish Sloyd in America.

It is hard to appreciate the imagination, spirit, and courage involved in this step. A young Swedish boy, eighteen years old, just finishing his education, left home, the only one in his family to do so, to come to a foreign land to begin his life's work. We, who know Josef Sandberg today, and know why he had the courage to accept this challenge, are thankful to Mr. Larsson. Sandberg's preparation for life had been a careful one, skillfully guided as he was by his schoolmaster father in the town of Skara. This early preparation had been that of all Swedish children, compulsory education from seven to fourteen years of age, similar to our old-time grammar schools, except for the emphasis on Sloyd. In addition to this, there was for Josef, advanced work with a special tutor, and also extra instruction in Sloyd under the tutorship of Mr. Albert Larsson. In addition to this, Josef went to the famous school at Naas. Considering all this, we realize that when Mr. Larsson's request came as Josef Sandberg was finishing at Naas, he was completing the highest education in industrial arts available in Sweden at that time.

Difficult as the decision must have been, both Josef and his mother realized that this was an opportunity, and so it was decided that Josef should have his chance. Then began his pilgrimage of two days to Hull, England, and then 11 days on the Cunard Liner Samaria, across the Atlantic to Boston.

Boston and Mr. Larsson

Sandberg's hopes, ambitions, and plans now were all tied up in those two names. The difficulties that beset one who did not know



Mr. Josef Sandberg

our language and customs must have been enormous, but they were consumed in the fire of Sandberg's ambition and desire to give to Sloyd work the place it deserved in American educational life. As is true of many great undertakings, its origins were humble. Sloyd work in America can name as its birthplace one room rented in the old Warrenton Street Chapel. The school was successful from the first, so successful that succeeding years necessitated moving to increasingly larger quarters, and so from one room in the Warrenton Street location, it was located successively, in the Rice School, Columbus Avenue; the North Bennett Street Industrial School, and finally Harcourt Street, all in Boston. The Sloyd School was essentially a teacher-training school, except when it was located at the Warrenton Street location and in the Rice School. At that time it operated as a regular day school, with the teacher-training schedule relegated to courses after school hours and Saturdays. After Mrs. Shaw's death the Sloyd School alumni paid the expenses of the school for one year.

In 1921, in recognition of the work being done, and to guarantee the training of manual-training teachers for its public schools, the city of Boston took over the Sloyd School and incorporated it into its public school system. At this time it became, and still is the Training School for Teachers of Mechanic Arts, and Mr. Sandberg entered the Boston school system through a competitive examination as an associate director of manual arts. Once again the location of the school was changed to Broadway, South Boston, where it stands today as a shrine to the courage and inspiration of a devoted worker and teacher.

Since that time Mr. Sandberg has gone faithfully on, giving to those who were to become teachers of manual training in our schools, the highest standards of craftsmanship, character, and work. But Mr. Sandberg's work was not confined to teacher training alone. Widely known as a man thoroughly versed in every phase of his subject, and vitally interested in his fellow men, he was the natural choice of the Boston Tuberculosis Association, when they sought, in the summer of 1930, to establish their Shelter Shop, a combination haven and workshop for those who had successfully withstood the ravages of this dread disease. Giving, as always, completely of himself, his full time and energy, his keen and active mind, he carefully planned and set up the shelter shop, which is still functioning.

In 1915 Josef Sandberg received an invitation to go to the State Normal School in Santa Barbara, Calif., and spent the summer there with his family.

Having seen Sandberg the teacher, and humanitarian, let us glance for a moment, that our sketch may be complete, at Sandberg, the family man. In June, 1901, he married Miss Bertha Brackett and the Sandberg's built their famous honeymoon cottage in Winchester, Mrs. Sandberg's home town, where they still live. Mrs. Sandberg is a charming woman, vitally interested in, and with a keen knowledge of every phase of her husband's work. Their two sons are fine examples of the way our American heritage is strengthened and improved when we are fortunate enough to have an unusual personality, and an exceptionally strong character, come to us, and bring the finest standards and traditions of his country.

Mr. Sandberg's education in Sweden had been the finest he could acquire in his field, supplemented in later years by courses at Harvard, Massachusetts Institute of Technology, and Clark university. His sons, both clever with their hands, did not care for teaching; their chosen fields lay in other directions. Edward attended Massachusetts In-

(Continued on page 330)

*Public Schools, Boston, Mass.

INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

John J. Metz, Editor

The First Month of School

No doubt your school has already started. How was the opening day? Did everything proceed according to your plans? Probably you were not quite satisfied. Some of your plans may have miscarried. What was the reason? Probably you do not know. The following check list, incomplete as it is, may help you locate the trouble, and overcome it.

Is the equipment in good condition? Have all possible safety precautions been taken to make the machines safe? Can one do good work with the power tools provided? If not, can they be put into good condition? How are the hand tools? Are they sharp, and are they readily accessible? How about the benches and vises? Are they fastened down securely?

How about materials and supplies? Are they stored so that they can be distributed easily and without loss of time? Have you worked out a good inventory and account system?

Have you sufficient working stations to accommodate any overflow students who may be put into the class? Have you worked out a good pupil-personnel program? How is your cleanup program working? Does it need revision?

Are you a friend of your students? Do they come to you with their personal problems? Do you take real personal interest in them? Are you helping them acquire proper habits and attitudes?

Probably you have worked out satisfactory solutions to most of the problems suggested by the foregoing questions. If not, it is not too late to start now. The results accruing from good planning will amply repay the teacher who spends time and effort to formulate a really workable program.

Have You Changed Your Address?

This is the season when many teachers find themselves in new surroundings. Some are starting out in their first teaching positions; others have changed schools. If the reader belongs to either of these two groups, he is no doubt very busy, right now, adjusting his life to the new environment and to his new duties.

For this reason his thoughts will be fully engrossed with many things. He may even forget entirely to notify the publication office of the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine of the necessary change of address.

It is very important to notify us, however. Frequently, the magazines directed to the old address are not returned. Then, when we are finally informed that certain issues have not been received, it may be impossible for us to replace them.

To avoid all this, please send us your new address.

Precollege Aviation Courses

The dire need for more pilots and ground crews to fly and service the ever increasing number of airplanes which America's productive power is causing to flow from its assembly lines, has caused the Civil Aeronautic Administration and the United States Office of Education to propose a plan promoting precollege aviation courses in junior and senior high schools.

That the schools will do their utmost to cooperate in this movement is natural. Some high schools had already anticipated this move and were offering such courses. The present emergency, however, gives much more justification and direction to courses of this kind than could be found in the past.

The question now is what courses are to be offered, what are to be their objectives and their content. Many high school teachers were wise enough to attend summer school in order to prepare themselves for teaching these courses during the school year 1942–43. Many, however, for one valid reason or another, could not avail themselves of these training opportunities. Some of these, nevertheless, will be literally forced into doing something to help this movement along during the coming school year.

They may obtain quite a bit of help by writing to the Civil Aeronautics Administration, Department of Commerce, Washington, D. C., the United States Office of Education, Washington, D. C., and Aviation Education Research Project, 525 West 120 St., New York City.

Courses offered by teachers who are not fully prepared to teach a given subject are never ideal, but in this case, even an effort which is not highly efficient is better than not doing anything at all.

Above all, it is well to impress upon the students that the probability of being a pilot is slim. The applicant for such a position must, first of all, pass a very rigid physical examination. Up to now, about one out of 10 applicants has been able to pass this barrier. Then only those who have a good standing in physics and mathematics are accepted.

Students should know, however, that for every pilot, there must be from nine to eleven men on the ground servicing, inspecting, and repairing the airplanes. These men, too, are vital, and while they may never get into the limelight of public acclamation, it is very certain, that without them, any hope of success in this world conflict would be mere folly.

How does the shop teacher fit into this picture? He really has a preferred position. True, he may not teach physics and mathematics in his class, but he has already laid a foundation for this kind of work in the past. His airplane models, his miniature gliders, his flying models of various kinds, all have given his students the feel of air flight. He can now add a new field by devising full-size or scale models of planes and parts of planes for use in the new aeronautics classes. Many shop teachers have already devised air tunnels for use in their own classes. He can show how the pilot controls the various parts of his plane and can do much to take these elementary aeronautics courses out of the realm of the abstract, into the field of applied knowledge where boys can learn, at least partly, by actual doing.

More Preinduction Training

Because 63 out of 100 inducted into the army require specialized training, the War Department, through the Civilian Personnel Division, Headquarters, Services of Supply of the Army, in collaboration with the United States Office of Education, is planning to start voluntary preinduction training programs in high schools and colleges for draft age out-of-school men and predraft age high school and college students.

This move will further streamline the mobilization of American man power for the present emergency. Such training will save much valuable time, as it aims to have men prepared for their duties when they are inducted into the army. It will also aid in getting each man placed in a position for which he is best fitted.

(Continued from page 328)

stitute of Technology and took evening courses at Boston University, and Lars graduated from Harvard with a doctorate from Harvard Business School. Small wonder that Josef Sandberg's heart should be filled with justifiable pride. Sandberg's life has been a full one, a complete one. He devoted his life to the establishment and perpetuation of manual arts in America. He had a great goal, and with his vision and hard work he has achieved it.

Boston regrets that Josef Sandberg, modest, unassuming, has left us little of himself in books and papers, but Boston is proud of what he has given of himself to all with whom he has come in contact, in teaching, in teacher training, and in all his outside works. If those of us who have been fortunate enough to have worked and studied with him, can pass on to those with whom we work a little of his art, his inspiration, and his devotion to work, we shall be assured that his work will continue. With Sandberg's pupils, spread all over the country as they are, the Sandberg spirit of calmness, tolerance, sincerity, and true ability will live forever.

Fifty-two years ago he knew that the future of Sloyd work in America depended upon two men — Gustav Larsson and Josef Sandberg. To this he dedicated his life. He realized his ambition and to its continued success we dedicate all our energies.

On August 31, 1942, when Josef Sandberg retired from the Boston public schools, the educational world lost a vital figure, but manual training will never lose its most ardent champion, for Josef Sandberg will carry on, and we who are concerned with industrial education will carry on that we may try to repay the great debt we owe to him and to the men of his country.

Pointers for the New Teacher

ALBERT E. JOCHEN*

Take nothing for granted.

Get a sympathetic understanding of as many students as quickly as possible — be one of them, yet hold their respect, friendship, and trust.

Remember that the students will never play any more fairly than you play. When you are wrong, admit it, and rectify your error.

Never request the students to do that which you cannot or would not be willing to do.

Don't be in a hurry to leave school. Let the students feel that you can be found after school.

Never make any threats or promises which you know you will not be able to carry out.

Read wisely and widely. Try to get a little information about many things so that the student's every problem, joy, hope, interest, and prayer may be meaningful.

Never cut a student short. Learn to be interested even when you are ready to drop from exhaustion or from sheer boredom. A mere nothing to you may be life's most urgent problem to the child at that time.

Stand on your own feet. Don't give up too easily or too soon. Learn to solve your own problems.

Always remember that the easiest thing to do is to excuse yourself and your teaching by saying that the child has a low I.Q., and is hopeless. Anyone can have a child expelled or transferred. Be the exception and try to aid the child in making an adjustment.

Try to accomplish at least one real fine thing each year in your classes or in your extracurricular activities.

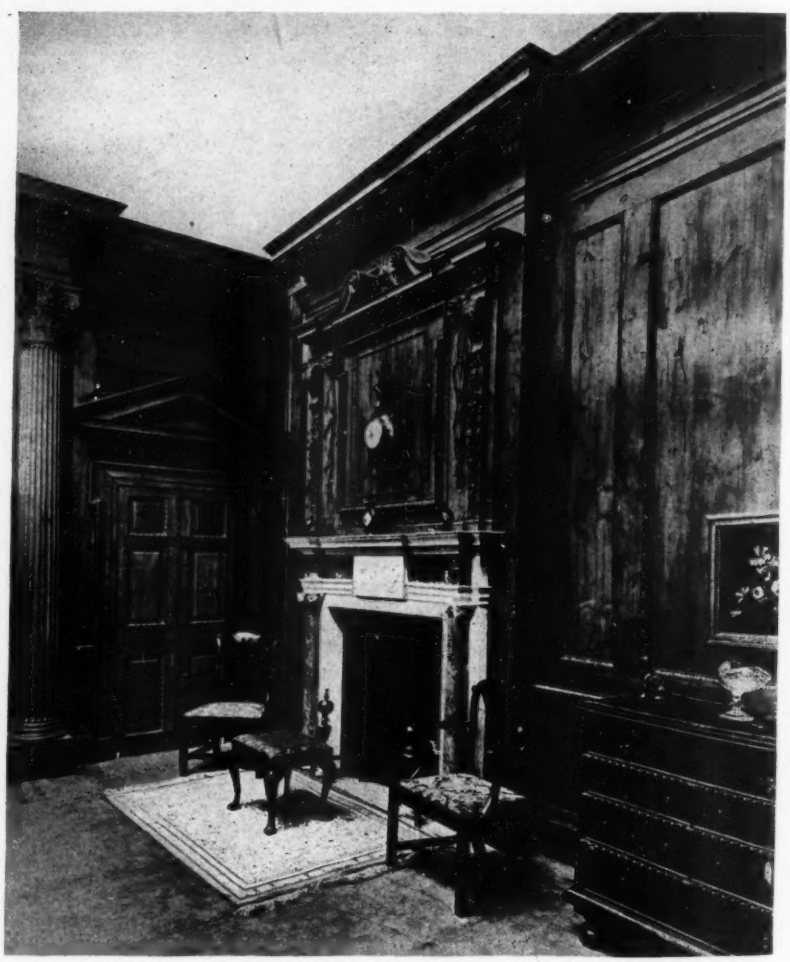
Develop a good sense of humor.

Divide the responsibility of routine matters among the students. Get them in the habit of assisting. Make them feel that they have a place in your room; that they are important.

When you are getting to feel self-satisfied with your work, enroll in a professional improvement course, visit and observe good teachers, and invite good teachers to criticize your efforts.

If, after a fair trial, you find that you don't like teaching, do the students and yourself a favor. Resign.

*Middlesex County Vocational School No. 2, Perth Amboy, N. J.



— Photograph courtesy of Gimbel Bros., New York City

Georgian room brought from England by William Randolph Hearst

Problems and Projects

TWO CYLINDER AIR COMPRESSOR

FRANK E. ANTHONY

Technical High School
Erie, Pa.

(See assembly and details on pages 348 and 349)

The two cylinder air-compressor details and assembly illustrated herewith is a practical, up-to-date problem for advanced and drafting-trade students.

The assembly drawing of the air compressor, in its clear and comprehensive form, will aid the student in understanding the relationship of parts as well as the importance of each detail. Oftentimes the drafting student is required to make a sketch of some machine detail. The purpose, of course, is to teach the reading, writing, and understanding of mechanical drawing. Quite often this understanding is quite vague to the student. The difficulty is that the student fails to visualize the significance of the detail as to its importance to the machine, device, or apparatus. Therefore, the assembly drawing will add to the clearness of understanding, and will have an interest appeal to all drafting students.

The air-compressor details are exceptionally clear. The illustrations will strengthen the teaching of contemporary drafting practices. The material has been thoroughly tested and can be added to material already in use in many drafting classes of the advanced and trade level. The common industrial drafting-room practice of assembling and detailing may be employed, in the execution of the illustrations, by drafting students.

WROUGHT-IRON SMOKING STAND

CLYDE R. SUTFIN

West Side Union High School
Los Banos, Calif.

This smoking stand, which follows the graceful lines of a flower, may be made by welding, or the design and size of the metal may be changed for riveting.

The metal may be left plain but a hammered effect looks better. For the hammered effect, peen the metal on all four sides with a ball-peen hammer, taking care to keep the metal fairly straight while peening. The piece is then made perfectly straight, and then shaped as shown. To finish the stand, apply a light coat of black lacquer. When dry, sand with emery cloth for high lighting and then apply a coat of clear lacquer to prevent rusting.

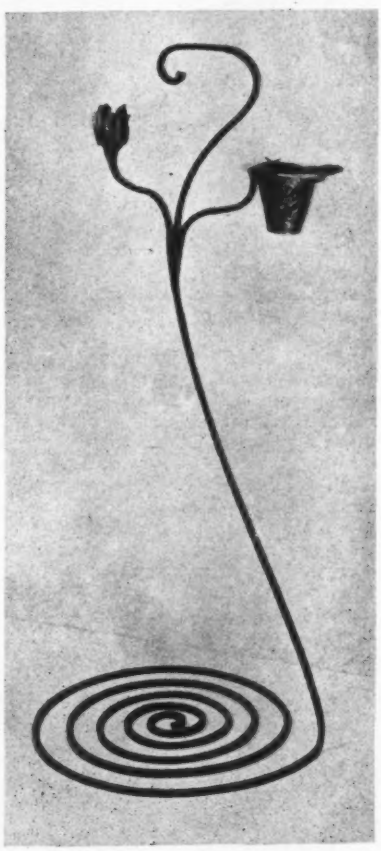
A full-size pattern is made of the stem and approximately what you wish the spiral base to be. The one shown here has five turns to give the base weight.

Start bending the iron at the small part of the spiral by placing the metal in the vise in a horizontal position with about ¼ in. protruding, and bend this with a hammer at the proper angle. The iron is again projected this distance and bent as before. Repeat this operation until enough of the scroll is made to allow bending by hand.

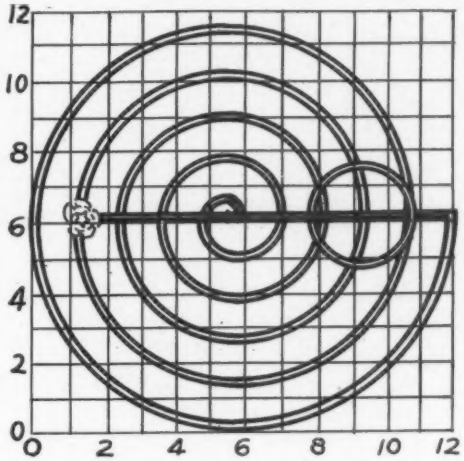
Caution: Keep the scroll in a uniform curve as you bend, as kinks or flat spaces cannot be removed in the first two or three turns of the spiral. Also, by the use of a wrench keep the metal from twisting as you work.

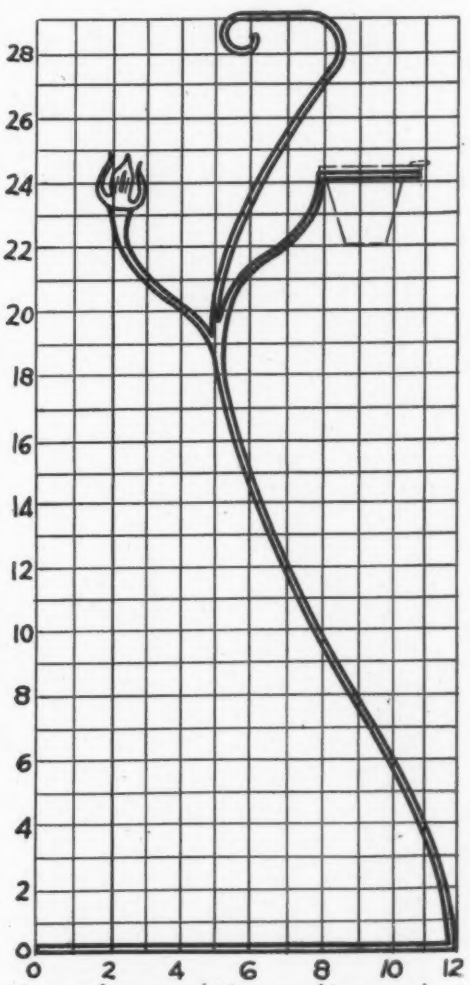
Continue the scroll in an ever widening spiral until 3 ft. is left for the stem. Then bend up at right angles and form the stem over the center of the base according to the pattern.

In making the ash-tray holder, form the circle first, bend down at a right angle and form the branch. The bottom end is tapered by grinding or forging to fit on the main stem at the proper angle.



Wrought-iron smoking stand





Layout for wrought-iron smoking stand

Bill of Material

No. Required	*Name*	*Material*	*Size*
1	Base and stem	Square mild steel	¼ x ¼ in. x 11 ft.
1	Flower stem	Square mild steel	¼ x ¼ x 8 in.
1	Tray holder	Square mild steel	¼ x ¼ x 16 in.
1	Flower and ash tray to suit		

The ash receiver may be balanced by a branch with a flower welded on top. This ornament may be made to hold the matches.

The branches are welded to the main stem. The dotted line in the drawing shows the profile of an ash receiver that will balance the design. Copper may be used for making this ash receiver, but the one shown here is made of black sheet metal that is peened to match the rest. The receiver has a 5/8-in. lip on which three cigarette holders are welded.

NOVELTIES MADE FROM A TABLE LEG

HAZEL F. SHOWALTER
Davenport, Neb.

Many interesting little articles can be made from deeply cut table legs, the various curves of the legs suggesting the novelties to be made.

The table leg shown in the figure was transformed into a lamp, two little shelves, and a vase. This particular table leg was under the center of a small table and had four fancy iron supports resting on the floor; this accounts for its small round lower end. The table legs that you find may be quite different from this one, but after a little study, the curves will suggest the novelties that may be made. Very often there are round ball-like parts in table legs that can be trimmed to complete the ball shapes desired for the shelves.

The central tapering part of this table leg was used for the body of the lamp with no alteration except the trimming of a tenon at its lower end. It was bored to allow the lamp cord to go down through its middle and come out at the hollow near the base.

In making the base, several things must be considered. If the lamp is to be given a transparent finish, the wood for the base should match that of the table leg, but if the lamp is to be given an opaque finish, any wood may be used. The size and thickness of the base also will depend upon the size of the pedestal. It is well to match the shape of the base and of the shade; that is, if the base is round, the shade should be round also, but if the base is square or rectangular, the shade also should have a similar shape.

After the standard of the lamp was mortised to the base, the lamp cord was put through the holes bored to receive it and a plug and a socket fastened to its ends. Then the socket was fastened to the top of the lamp with a liberal amount of plastic wood.

Each of the little shelves was made by fastening a piece of the table leg under a small board. The shape under the smaller shelf is ornamented with three heads of small clothespins mortised into its sides, the one in the middle concealing the head of a long screw that is used to fasten the shelf to the wall. The larger shelf is bored to hang on two hooks in the wall which will be concealed within it.

The little vase or holder is hollowed out and then ornamented with clothespin heads which are mortised into its sides. Such a vase may be used for artificial flowers or it may have a metal or glass holder placed in it so that it can be used for fresh flowers.

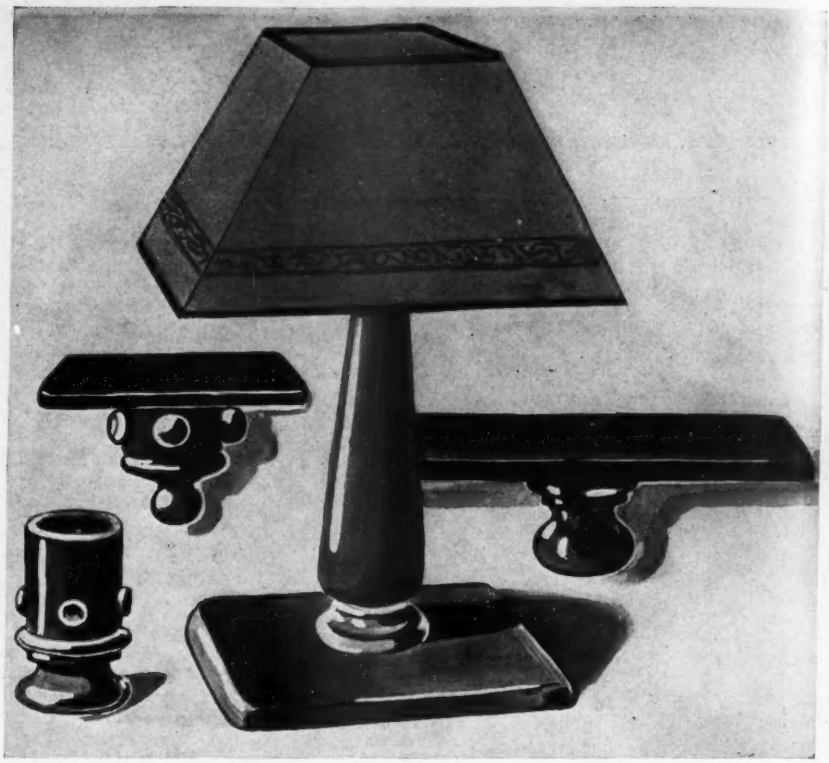


Fig. 2. Salvaged table legs turned into useful articles

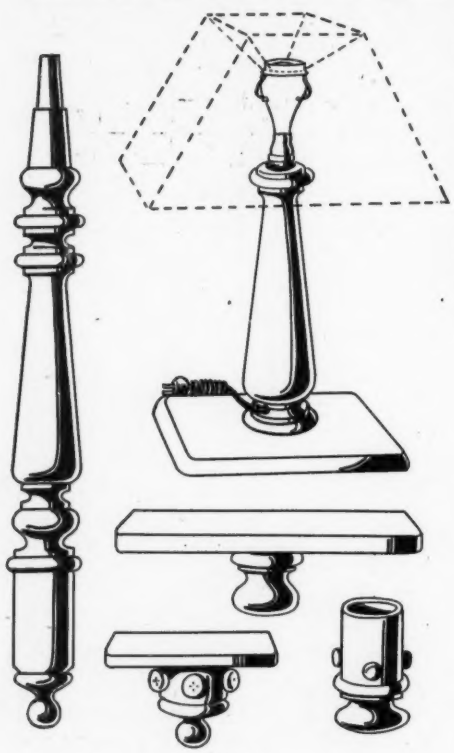


Fig. 1

GOURDS AS MATERIAL FOR HANDICRAFT

HAZEL F. SHOWALTER
Davenport, Neb.

Many decorative novelties can be made from gourds. A can of quick-drying composition wood and enamel in colors are needed for some of the novelties; for some a small piece of wood or perhaps a few short bolts.

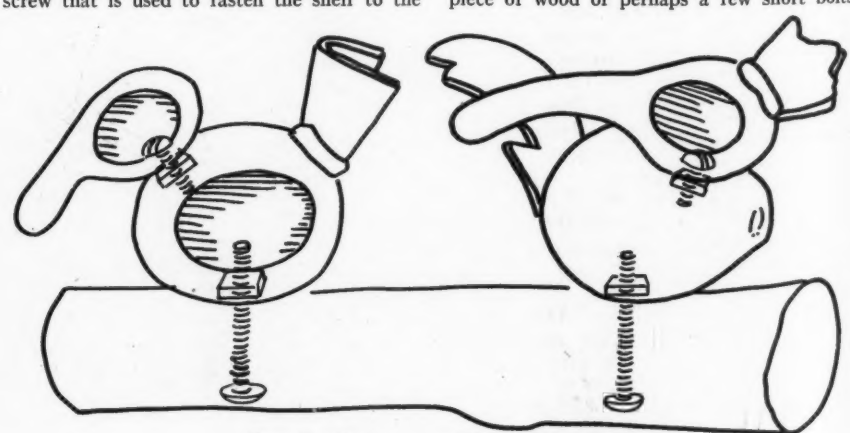
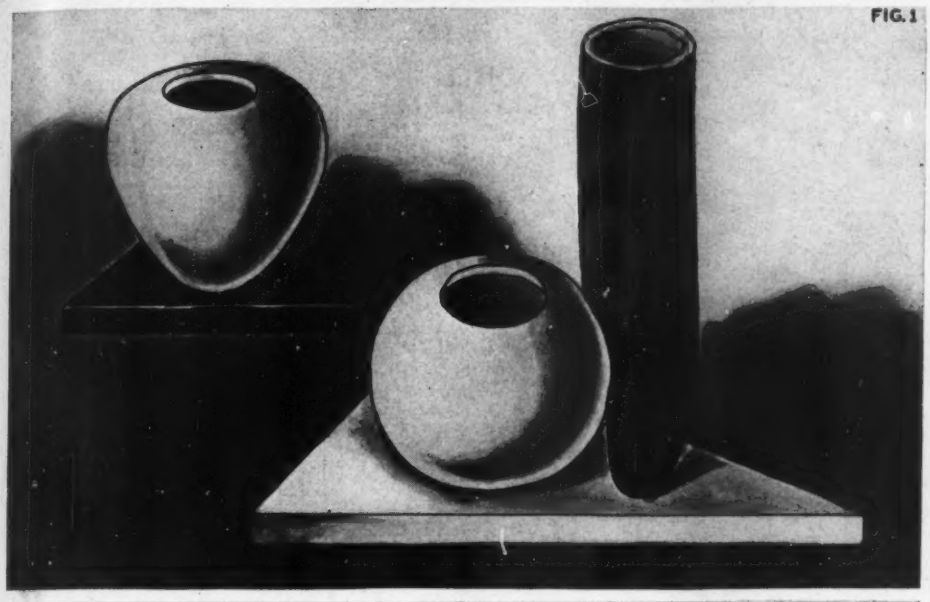
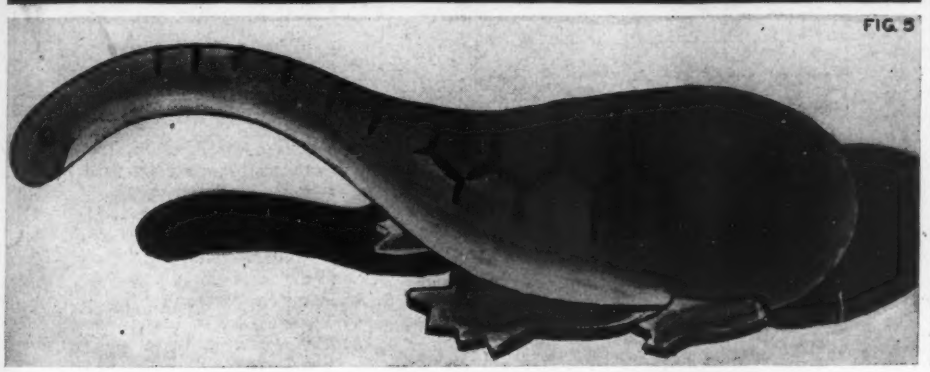


Fig. 3. Projects made out of gourds





Various products made out of gourds

Use a saw for the straight cuts across the gourds and use a sharp-pointed knife for the curved cuts. Clean the seeds from the gourds and the hard pulp from the ones that have it—the large gourds do not.

The waxy outer skin must be scraped from the shell where composition wood is to be applied. Sometimes it is necessary to scrub the waxy surface with scouring powder before enamel can be applied successfully. Occasionally this outer skin is scratched and spotted and the looks of the gourd shell can be improved by its removal. After the shell has been soaked in water a few moments, the skin can be scratched from it with a knife.

Allow the shells to become entirely dry before using composition wood or enamel.

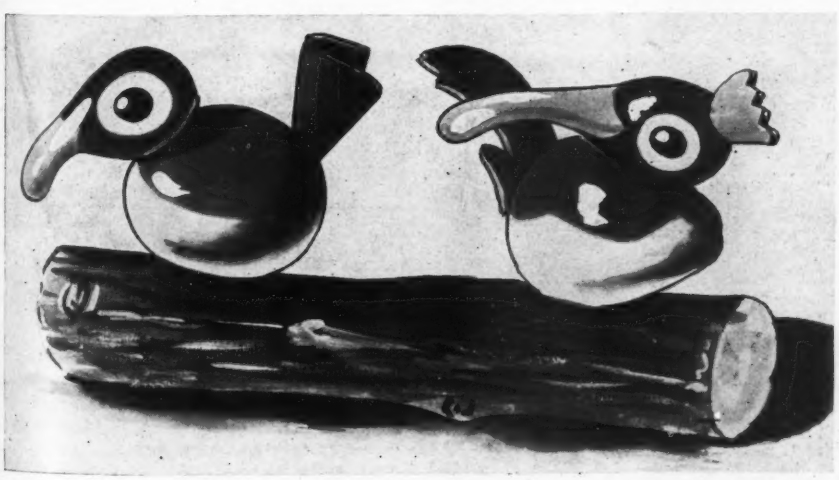


Fig. 4. Grotesque birds made out of gourds

Modernistic Vases

It is easy to obtain modern effects with gourds. The tall black vase shown in Figure 1 is the handle of a dipper gourd. Beside it and contrasting sharply with it is an almost perfectly round, cream-colored gourd with a quite small opening cut in the top of it.

The single vase is an orange gourd shaped larger at one end than at the other and having only a small opening. Its base is a small black triangle of wood.

The gourds are fastened to the bases with screws the heads of which are concealed with plastic wood. One coat of enamel is used on the gourds, and two on the wooden bases. The colors chosen add to the modern effect. The single vase is pale orange on a black base. The tall vase is black, the round one cream, and the base is an irregular white triangle.

A Wall Vase

The discarded handle of a dipper gourd can be used to make an ornamental wall vase, like that shown in Figure 2.

Trim the cut end in graceful curves, the front lower than the back. Cut a shield-shaped piece for the back from any thin wood. From a tin can with a gold-colored lining or from any available thin metal, cut an ornamental band to go around the vase and through a slit in the back to fasten the

vase to the back. Repeat the shape of the backpiece in miniature at the center of the band. Lacking suitable thin metal, fasten the vase to the backpiece with a cord put through two holes bored through both the vase and the back.

Enamel the vase and the backpiece before putting them together. The shield might be dark brown and the vase pale greenish blue or amber.

The vase may be used for artificial flowers as it is. With a glass tube in it, it may be used for cut flowers.

Two Little Birds on a Log

These comical little birds shown in Figures 3 and 4 turn toward each other and away again and twist their heads to assume many amusing poses.

Two gourds are required for each bird. A tiny long-handled gourd is used for the head and bill and an oval or pear-shaped gourd for the body, also a scrap of gourd shell for a tail and perhaps for a crest. Remove a wing-shaped piece of shell from each body and an oval piece from each head so that you may remove the pulp and put the bolts in place.

Do not use a brace and bit to make the holes for the bolts, but gently twist a bit or the point of a knife against the shell with your fingers. Fasten each body to the log by a bolt put through the log from its underside and fasten the head to the body with a short bolt leaving the joints loose enough for all of the parts to turn freely. A drop of enamel on each nut will keep it from working too loose. When the shells are dry, the pieces cut from them may be fastened back in their places with plastic wood.

The crested bird has a yellow breast, bill, and crest, with other parts deep orange. The other bird is more subdued in blue and light cream.

A Prehistoric Monster

The prehistoric monster shown in Figure 5, is made from one of those slender gourds about 24 in. long. Its four flat feet are cut from discarded pieces of a thick-shelled gourd and are fastened to the body with composition wood. Features and markings are made with dark colored enamel.

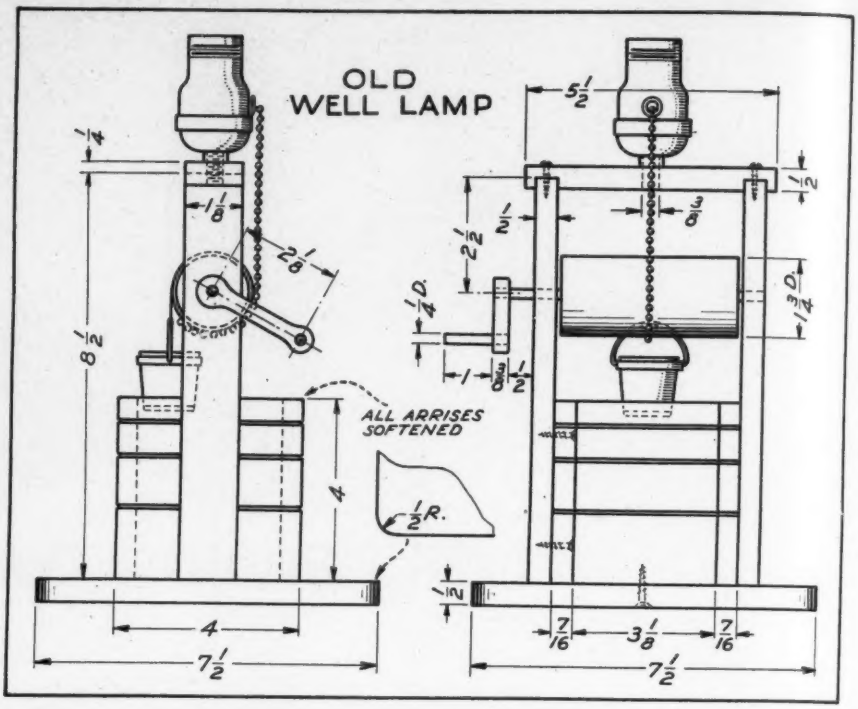
An endless variety of animals and birds may be made by joining gourds and pieces of gourd shell in various ways.

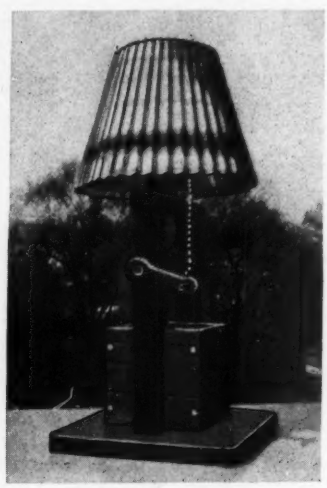
OLD WELL LAMP

ROLAND M. BACON
George Washington High School
Danville, Va.

The "Old Towne Pump Lamp," published in the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine several years ago, has proved to be a project of great interest stimulating value among boys of junior high school age. It has been used frequently as a beginner's project and much of its appeal is due to the fact that it has a movable part; something to manipulate that really works. It is nothing short of sensational the way the boys love to work that handle up and down, turning the light off and on. From the woodworking instructor's point of view it contains many of the basic principles which he wishes to teach.

In view of the above facts a search has been made for some time for a project making use of similar ideas of construction and attractiveness in the eyes of the boys.





Old well lamp

The inspiration for the lamp shown herewith was obtained from the old wells of this type still to be found in use by the country residents of old Virginia.

The project works well and is being used as a club project. The following is a plan of procedure which may be used:

1. Square up all parts to dimensions.
2. Bore the holes for the No. 7 by 1-in. flathead brass screws used to fasten the base to the sides. Countersink the holes.
3. Bore the holes for the No. 7 by ⅝-in. flathead brass screws used to fasten the sides to the uprights. Countersink the holes.
4. Bore the holes for the No. 6 by ⅝-in. roundhead brass screws used to fasten the sides together.
5. Bore ¼-in. holes for the axle of the winch, and the ⅜-in. hole in the top member for the ⅛-in. pipe which holds the socket in place. Also make the holes for the No. 6 by ⅝-in. roundhead brass screws used to fasten the top member in place.
6. Lay out and cut groove at each end of the top member.
7. Make winch, crank, and handle.
8. Sand all parts smooth.
9. Assemble the parts in the following order:
   a) Fasten sides to uprights.
   b) Put winch in place and be sure it rotates easily.
   c) Fasten sides to ends.
   d) Fasten base to box.
   e) Fasten top member in place.
   f) Glue on crank and handle.
   g) Install electrical equipment; fasten pull chain to winch and wind cord on for pulling up bucket.
10. Make grooves for board effect on sides.
11. Apply the finish. This may be walnut stain, followed by a coat of linseed oil, another of shellac, followed by rubbing down and waxing.

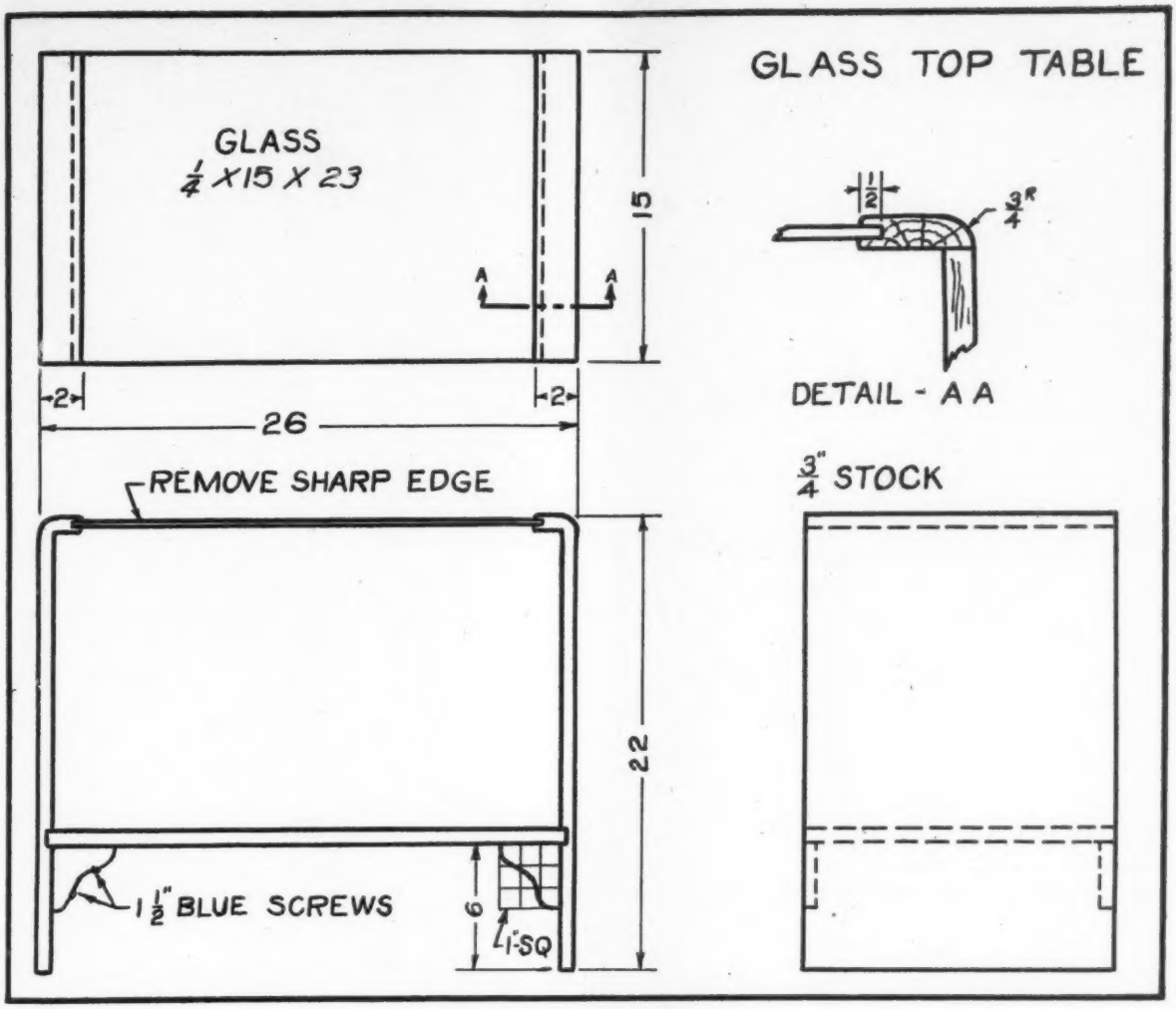
No. pieces	*Material*	*Size*	*Name*
1	Walnut	⅜ x 7½ x 7½ in.	Base
2	Walnut	½ x 1½ x 8¾ in.	Uprights
2	Walnut	7/16 x 4 x 4 in.	Sides
2	Walnut	7/16 x 4 x 3⅛ in.	Ends
1	Walnut	½ x 1⅜ x 5½ in.	Top member
1	Walnut	1¾ x 1¾ x 6 in.	Winch
1	Walnut	⅜ x ¾ x 2¾ in.	Handle
1	Walnut	¼ x 1½ in.	Dowel rod
1	Walnut	1½ x 1½ x 1⅜ in.	Bucket

GLASS-TOP TABLE

JOHN F. SHAY
Dayton, Ohio

Shop teachers are constantly on the alert for projects that differ from the usual type of jobs found in school shops. With the increasing difficulty of obtaining various materials, shop teachers will have to exercise their ingenuity to keep up the fine work they have done in the past.

The glass-top table described here offers a bit of variety, yet is simple in its construc-



Details of glass top table

tion. The wood used for the table shown in the illustration is walnut; however, the material to be used may be left to the selection of the student.

Glass for the top may be purchased at most hardware stores and will cost approximately $1.65. When the glass is cut at the store have the sharp edges removed.

At first thought one may think that the project would not be practical because of the glass; however, the one shown has been in use for the past three years, and has proved to be a useful and attractive piece of furniture.

Bill of Material

No. Required	*Name*	*Material*	*Size*
2	End	Walnut	¾ x 15 x 22
2	Top rail	Walnut	¾ x 2 x 22
1	Shelf	Walnut	¾ x 15 x 25¼
4	Brace	Walnut	¾ x 3 x 3
1	Top	Glass	¼ x 15 x 23

WROUGHT-IRON COFFEE TABLE

CLYDE R. SUTFIN

West Side Union High School
Los Banos, Calif.

The wrought-iron coffee table described herein requires but four pieces of iron below the top, the legs forming their own braces. When the table is completed it has a massive, yet graceful appearance.

Wrought-iron coffee table

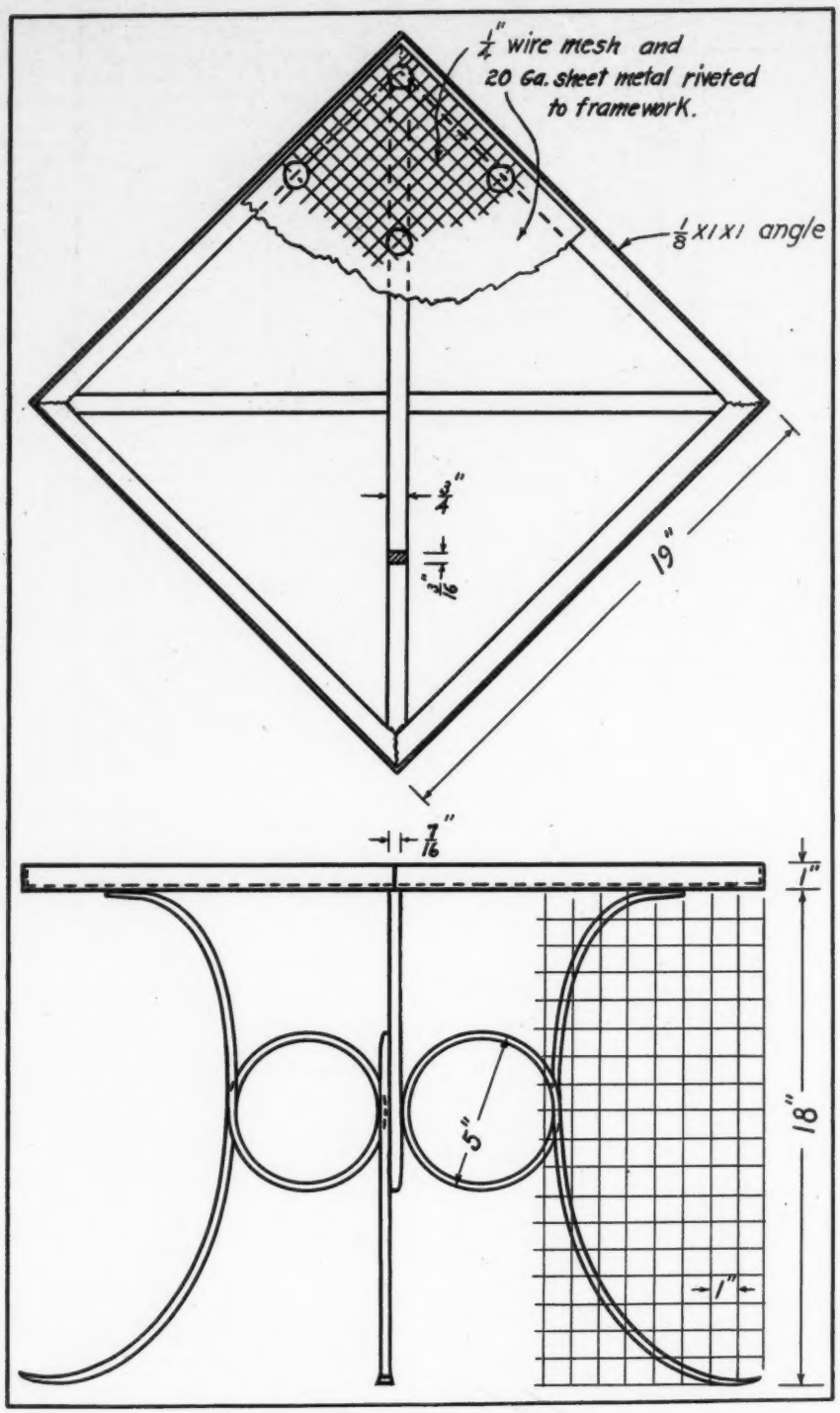
Make a full-size drawing of one leg and cut four pieces of metal to length. Heat and flatten and widen the bottom ends of the legs for about 3 in. when finished. The top may also be flattened somewhat to make welding easier. Start at the top of the leg and bend to fit the pattern, always keeping the same edge of the iron on the line. As the metal used is 7/16 in. square it is bent cold in the vise. An easy way is to leave the jaws partly open and loose on the metal. The iron is then pushed up through the jaws from the bottom and bent on top, pushed up again and bent, and so on, forming the circle and curve of the leg.

Next make the top frame by sawing out of the one leg of the ⅛ by 1-in. angle iron, a 45-deg. V-shaped piece every 19 in., where the corners come and bend there at right angles forming the square.

The two diagonal top cross braces are cut to fit in the corners and may be lapped in the center or butted and welded. Now assemble the top by welding the braces and three corners, but do not as yet weld the corner where the ends of the angle iron join, or the frame will warp because of the contraction and expansion caused by the heat.

Two opposite legs are now placed on a cross brace and welded to it after checking their circles to see that they are the same height. A slight slippage in or out of the leg where you weld will change the height of the circles considerably. In like manner weld the other two legs to place.

A piece of 7/16-in. square iron about 1 in. long is used as a spacer where the four circles



Wrought-iron coffee table

touch each other and the circles welded to it on the bottom side one at a time. Using a large square, make sure that the legs are at right angles to the top before welding them together.

A piece of 20-gauge sheet metal and a piece of wire mesh are cut to fit inside the frame to hold and bind the cement and tile. They are riveted to the frame every 6 or 8 in., the rivet head and a washer being used on the mesh side.

After checking the top for warpage, the corner left unwelded is now welded as quickly as possible to prevent the frame from warping by excessive heat. If welding is not done in the school shop the joints may be modified for riveting.

Either colored cement, Marble-X, or tile is used for the top. If tile is used a good design is a 12-in. colored picture in the center made from 6-in. tile with a border of 3-in. black bathroom tile on the outside. Also a 9-piece over-all geometric design can be made from 6-in. tile.

Tile should be set in either Medusa or Keene's cement, because both set quickly.

This type of table should be finished plain to conform to the ancient forge masters' craftsmanship and not dolled up by coloring or hammering. Simply brush well with a wire brush and apply two or three coats of clear lacquer.

Bill of Material

No. Required	*Name*	*Material*	*Size*
4	Legs	Mild Steel	7/16 x 7/16 x 42
1	Top Frame	Angle Iron	⅛ x 1 x 76
1	Top Cross Braces	Mild Steel	3/16 x ¾ x 24
1	Cement Holder	Sheet Metal	20-gauge x 18½ x 18½
	Wire Mesh		18 x 18 x ¼-in. squares
	Tile		18 x 18

ORNAMENTAL METAL BELTS

KENNETH R. KUEMMERLEIN
High School
Ladysmith, Wis.

Materials: The material may be sheet copper, iron, brass, or other sheet metal of about 16 gauge for the flat units, and 1/16-in. wire for the chain links.

Equipment: Wood mallet, metal saw, ball-peen hammer, vise, soldering iron, acid core solder, files, steel wool, and large-size nail.

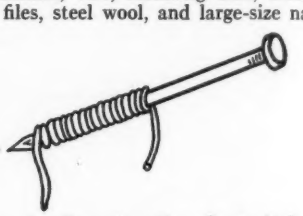


Fig. 1. Forming the chain links

The chain links: Wrap the wire around a nail which is large enough to make a link ¼ in. in diameter. The belt needs about 40 links (this depends upon the size of the belt and the number of units). The wrapping should take about 20 turns for making one group of links, as shown in Figure 1. Place the firmly bound wire end in a vise and cut through the wire wrappings with a metal saw. Each cut will make a single link, as shown in Figure 2. These links will join the flat units through drilled holes. Each of the links is to be put in place, closed, and then soldered.

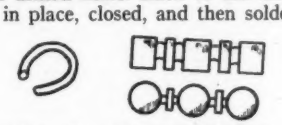


Fig. 2 Figs. 3 and 4

The flat units: Make several designs for the units based on the square, circle, oval, or oblong. Figures 3 and 4 show some rough examples but many other variations are possible.

Make a cardboard pattern and mark out enough units on the sheet metal to make the desired belt length. Then saw out the units. These units may also be ornamented by

Fig. 5 Fig. 6

soldering another piece on top as shown in Figure 5. This soldering should be done before the pieces are bent or domed. The units may be bent around a wood form held in the vise, and circular units may be domed with the ball-peen hammer.

The flat units are completed by drilling two holes on each side of each separate unit, as shown in Figure 6. The holes must be large enough to slide the rings or links through. After the links have been closed, the joints should be soldered with the soldering copper or with a blowpipe.

The belt buckle: This is made of narrow strips, bent and soldered on as shown in Figures 7 and 8.

Figs. 7 and 8. Belt buckle

Polishing: After the belt has been completed, all edges and corners should be filed smooth, after which the entire belt is to be polished with steel wool and pumice stone. It may then be shellacked to keep the sheen, or it may be left bare.

This method of making belts may also be applied to the making of bracelets and necklaces.

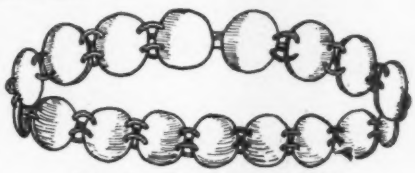


Fig. 9. The finished belt

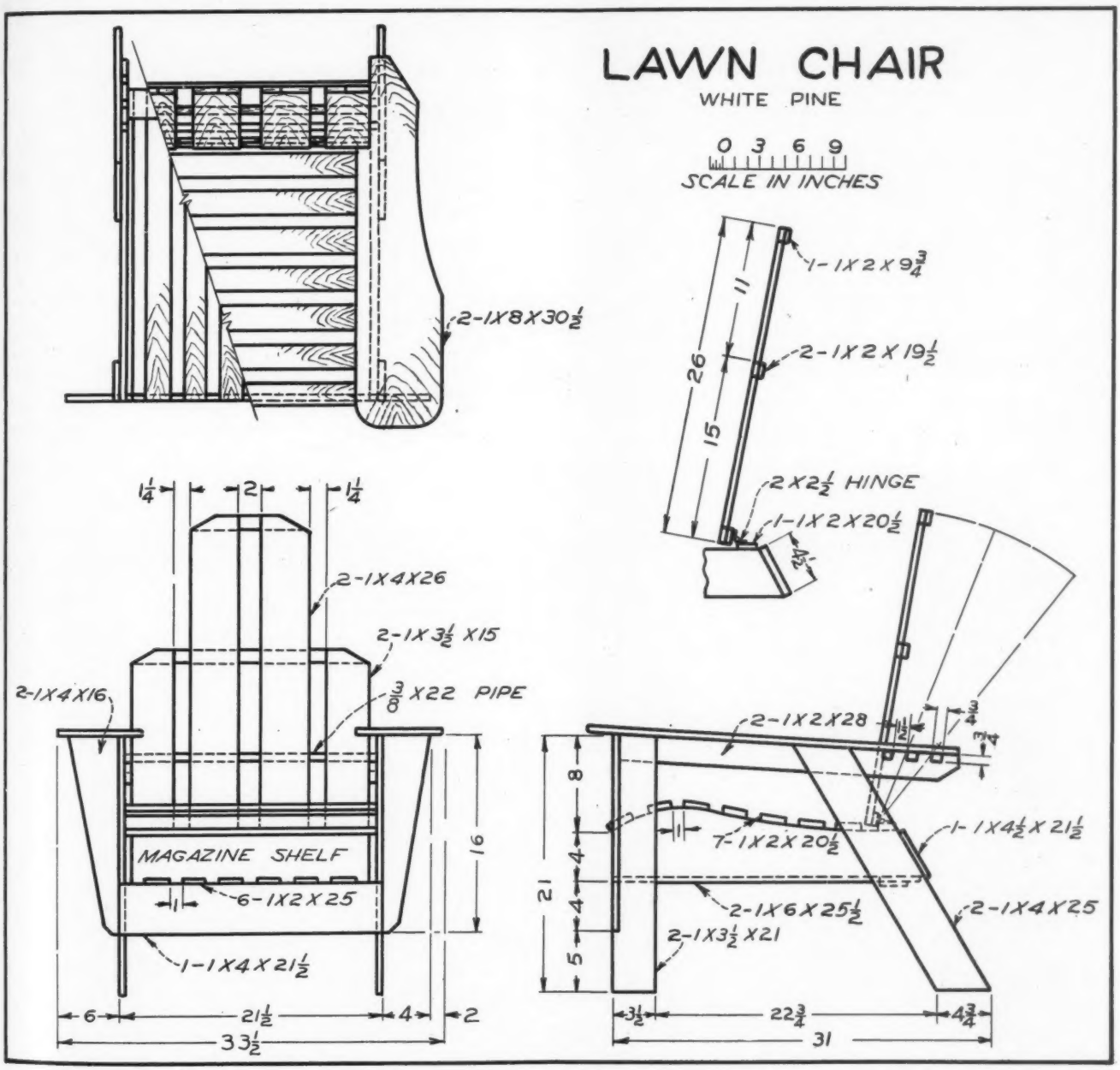
INDUSTRIAL ARTS GOES INTO THE HOME

DAVID R. WINEGARDEN

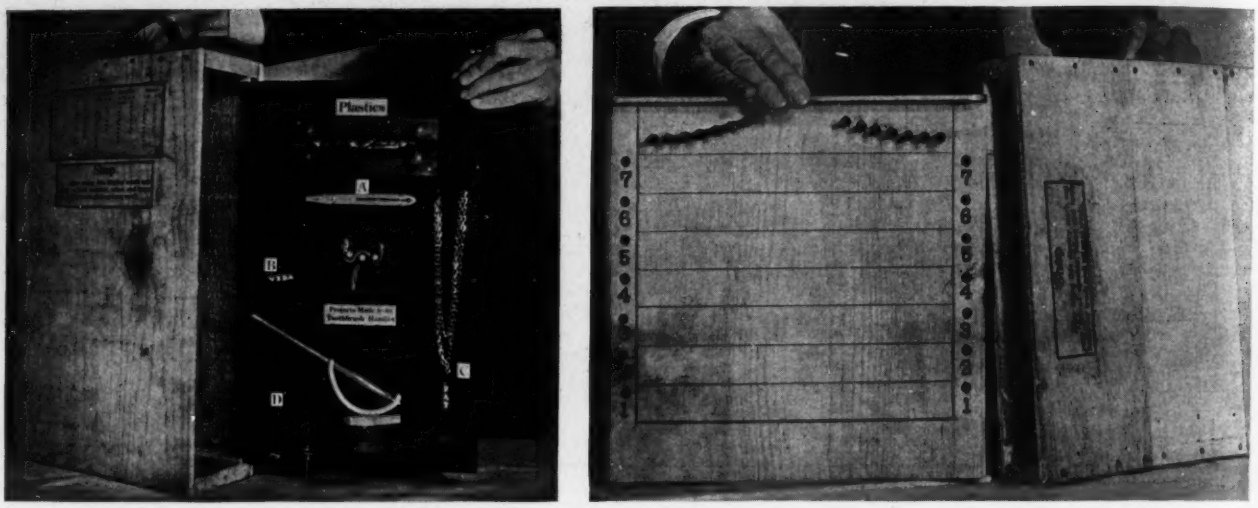
William Bell School
Indianapolis, Ind.

Much has been said and written during the past 10 years on the subject of leisure time. Its value from an educational standpoint has been established. During these same years many schools have reorganized their industrial-arts courses of study so that the work would provide for a wider range of shop experiences. In general these new courses of study deal basically with knowledge and skills set up for the student to acquire through shop activity in the school.

Now as we enter a new year and find that unsettled social conditions are leading many



Lawn chair designed by Roy E. Vile, High School, East, Wichita, Kans.



On the left at A is shown a pencil holder with a jig for shaping the plastic. At B is shown a barpin with noodle letters. At C is a pendant with noodle letters and at D a penholder stand. On the right is shown a panel on the back of which is helpful information for the home craftsman

laymen to examine the educational system with a critical eye, it seems wise for us to check our programs so as to make sure that the organization and execution of correct leisure-time pursuits are not neglected.

Although the following table is an estimate regarding the division of a boy's time, its figures show at a glance that there are over three times as many leisure hours as school hours. How are these leisure hours spent? Do boys choose the wrong things to do during their spare time because someone has failed to direct their excess energy into satisfying channels?

As a result of such a program checkup, the industrial-arts department of the Indianapolis public schools has developed a plan for a wide range of pupil and parent experiences. Under the plan pupils receive guidance and credit for work they do in the home when this work is related to the school curriculum. Heretofore industrial-arts home contacts have been made through school hobby clubs and home-mechanics courses. Under the new plan, however, pupils receive guidance and credit for any type of handwork carried on in the home.

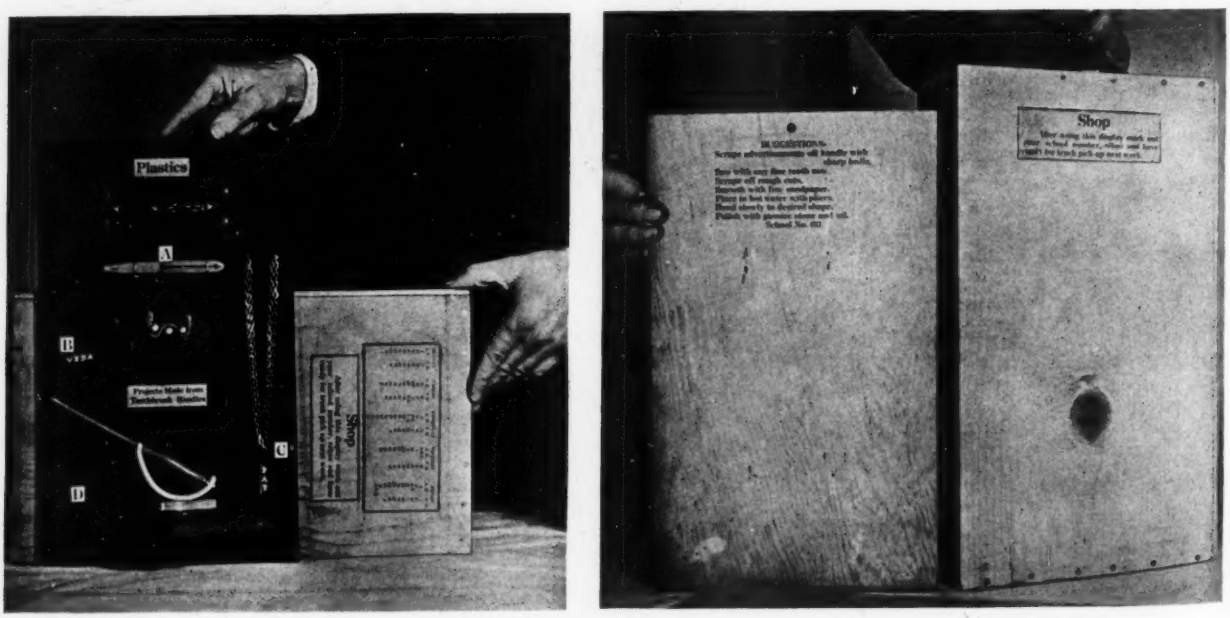
Estimated Division of a Boy's Time

In school.....	5½ hours — 180 days	990 hours	11 per cent
Sleeping	9 hours — 365 days	3285 hours	37 per cent
Eating	1½ hours — 365 days	548 hours	6 per cent
Church	2 hours — 52 weeks	104 hours	1 per cent
Leisure Time		3833 hours	43 per cent

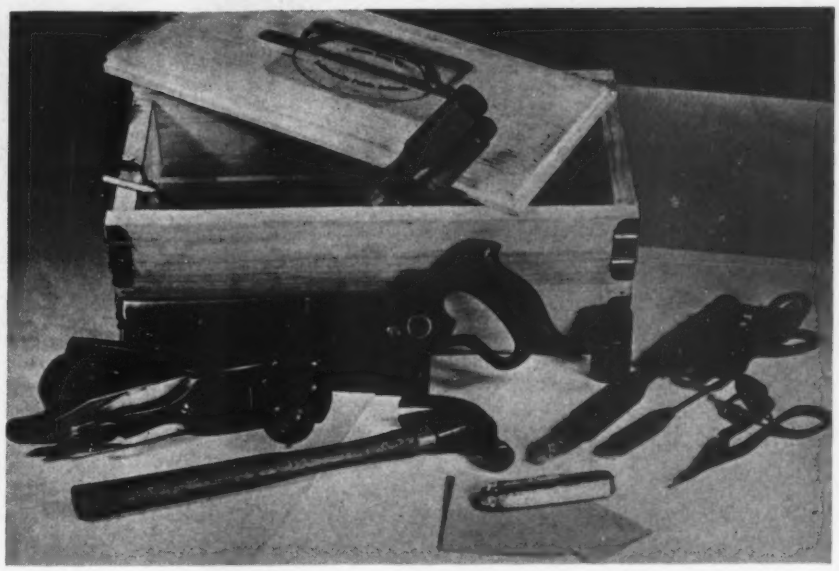
Total hours in year: 8760 hours

Suitable home projects are on display in each school shop. Special shipping boxes are provided for all projects so that they can be sent to the different schools. Detailed instructions regarding their construction are glued to the back of each display. Each week the regular school supply truck leaves a new display and picks up the old one, which in turn, is left at the next school. These projects may be started during the regular school class time and completed at home or they may be made entirely in the home. Projects used up to this date have all been made from used or discarded materials.

When the program was first introduced, teachers soon discovered that many boys were interested in making some of the projects,



On the left is shown a display box made of material salvaged from apple boxes. The handles are made from old belts. On the right is shown a home-loan kit.



On the left is shown how the display is fastened to the panel. Cleats inside of the box prevent breakage. On the right is shown a large gameboard. Such projects are boxed without a panel

but were handicapped due to the lack of tools. To overcome this obstacle, several experimental woodworking and sheet-metal home-loan kits were tried out in one of the seventh- and eighth-grade junior high school centers. The request for these kits has proved so satisfactory that similar kits are now available to all seventh- and eighth-grade shop boys in the city.

Early results show that many projects are carried on through the combined efforts of both the father and son. The father finds it is a great satisfaction to act as a guide while furthering the enjoyment and education of his son, while the son gets a thrill from the interest his father shows in the work. Also, the boy finds that it is not necessary to go outside the home in order to enjoy his spare time. Both father and son are becoming better acquainted with their hands and are finding an increased joy through time well spent in the construction of homemade articles.

Besides providing opportunities for parents and children to work together in the home, it is hoped that the program will stimulate an active family interest in schoolwork and thereby help to keep education in the forefront of public good will.

PEWTER NAPKIN RINGS

V. A. JOHNSON

High School
Wayzata, Minn.

It has long been a problem in my art-metal course to make use of the scrap pewter.

To eliminate this waste I hit on the idea of casting napkin rings. This innovation worked very well and has become very popular in our shop. Our only problem now is to get *scrap* pewter.

Procedure:

1. Turn up a mandrel 4 to 6 in. long and with a diameter equal to the inside opening of the ring wanted. We make it 1¼ to 1½ in. The length is not so important, although it will be put in the lathe again after the casting is made. We have learned that to slightly taper this cylinder toward the dead center end will help later.

2. Turn up a hardwood chuck on a faceplate, and bore a hole in it with a diameter equal to the outside of the napkin ring. One and one-half to one and five-eighths inches will do. See Figure 1.

3. At the bottom of the hole make a recess ¼ in. deeper to allow a seat for the mandrel.

4. To assemble, remove block from faceplate, set on top of the bench, and place the cylinder vertically in the center recess.

5. Since pewter has a low melting point, a gas furnace or blowtorch may be used to melt the metal.

6. Pour the molten metal into the mold. After it has cooled thoroughly it will slip out of the mold quite easily.

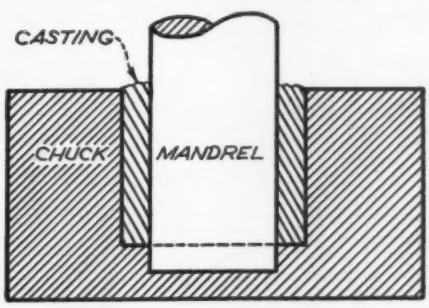


Fig. 1. The ring mold

7. If the ring is rather loose on the cylinder push it toward the large end of the mandrel until it is tight. Avoid driving it on with a hammer since that might scar the pewter.

8. Remount the mandrel with the pewter ring on the wood lathe ready for the metal turning.

9. Since pewter is relatively soft, the outside can be turned to any design wanted. The ends can be easily shaped. For a turning tool we use an old 6-in. flat file ground to a chisel edge. Be sure that a handle is used on the file. We are careful to save all cuttings removed from the ring for remelting.

10. To polish use very fine emery cloth, crocus cloth, or steel wool.

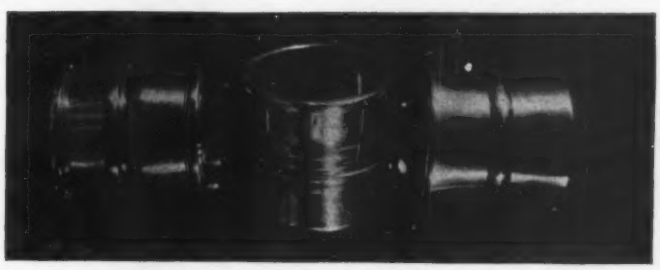


Fig. 2. Finished napkin rings

11. To smooth and polish the inside of the ring, mount the ring in a faceplate chuck working one half of it at a time as in wood turning.

In an emergency any intelligent quick action is better than delay in search of the ideal.

— *Edwards and Company,*
Norwalk, Conn.

"Don't repeat and don't allow to be repeated anything concerning the war and our preparations for war unless you have authority for the statement."

— *Captain Roswell P. Rosenbrand,*

Whittling-Jackknife Technique

W. BEN HUNT
Hales Corners, Wis.

(Continued from page 319 of the September, 1942, issue)

Marquesas Island Stilt Steps

After whittling and studying totem poles from Alaska, the reader is asked to take a long jump to the Marquesas Islands in the South Seas. From among the many interesting things these South Sea Islanders whittle, the stilt steps shown in Figures 91 and 92 were chosen for this article. These stilt steps are quite ornamental for the purpose. The back is slightly hollowed to fit the pole to which it is firmly lashed, thus making it possible to change the height of the steps easily.

These stilt steps at once suggest two modern uses, namely, coat hooks and shelf brackets. Figure 91 shows the stilt steps transformed into coat hooks, and Figure 93 shows one end of a shelf which is supported by one used as a bracket.

Fig. 91. Marquesas Island stilt step

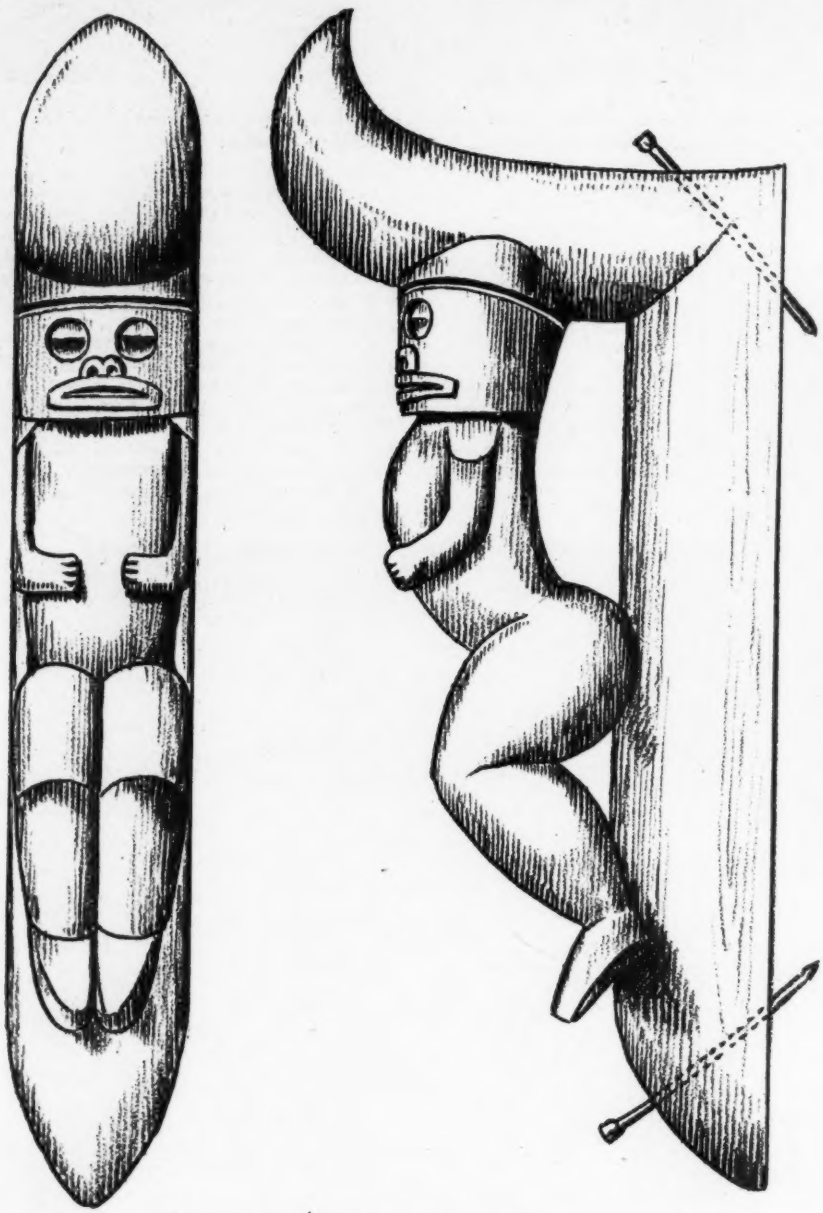


Fig. 92. Full-size pattern for transforming the Marquesas Island stilt step into a coat hook

Fig. 93. The stilt step converted into a shelf bracket

Stilt steps can be whittled from ¾, ⅞, or 1-in. pieces of board. Figure 92 may be used as a full-size pattern. To make them substantial, birch or mahogany is best, mahogany being the easier of the two to whittle. The back of the step should be left flat and it can be fastened to the wall with two finishing nails as shown. To prevent splitting, drill the pilot holes slightly larger than the nails.

Hawaiian Aumakuas

Aumakuas, as is evident from the examples in Figure 94, are rather bizarre, but interest-

ing nevertheless. The body is quite simple, but the head represents a real job for the whittler. Most South Sea Island whittling is done on dark native woods, and most of it is carefully sanded and polished. The Aumakua shown in the photograph was whittled of poplar wood and photographed before finishing. A dark mahogany stain may be carefully applied so as to make the grain less conspicuous. This should then be followed by a coat of dull varnish, and lightly rubbed down with fine steel wool. A second coat should be applied if the end grain takes up too much of the varnish.

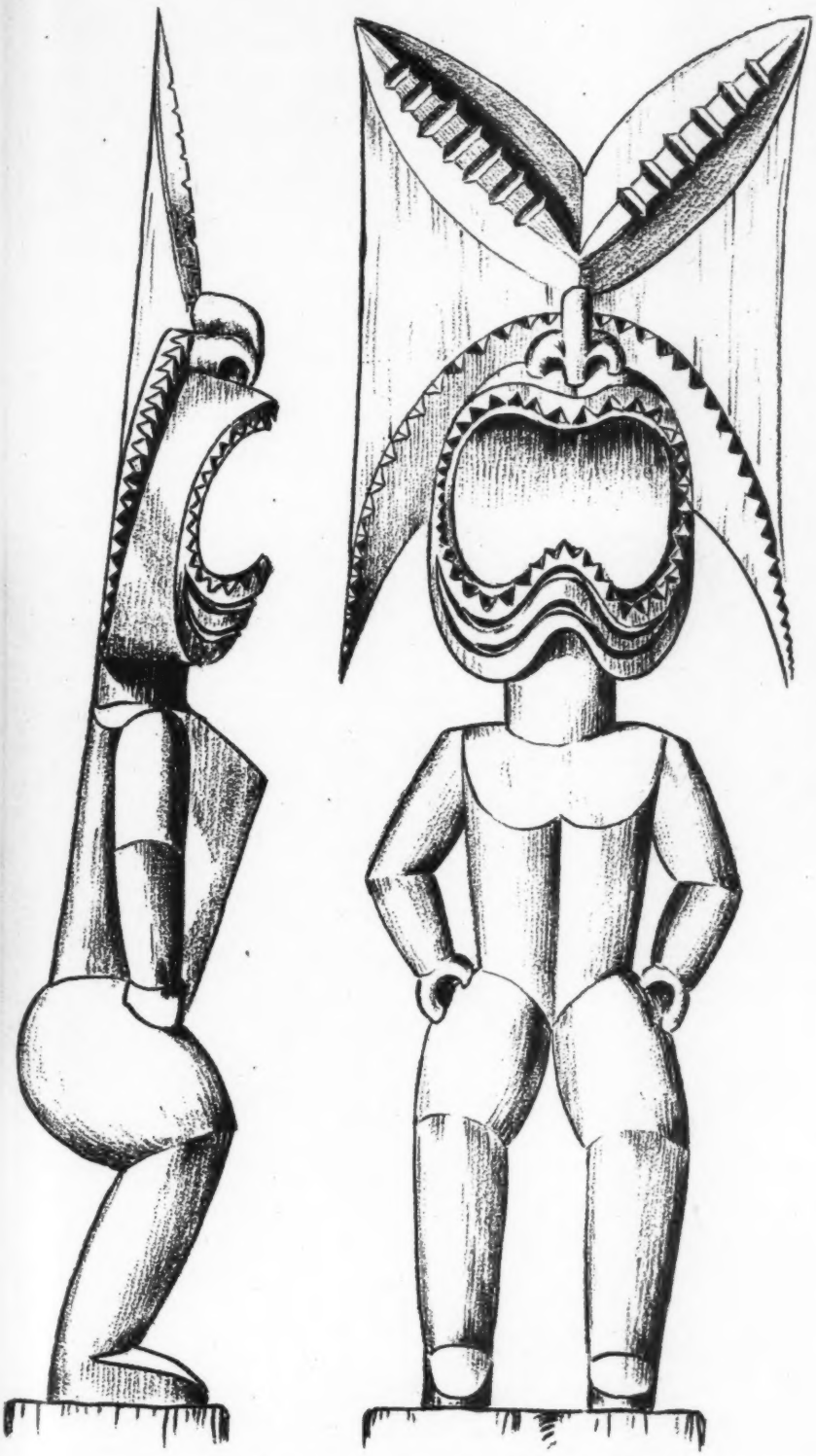


Fig. 95. Full-size pattern of an Hawaiian Aumakuas

Fig. 94. Hawaiian Aumakuas

Figure 95 may be taken as a full-size pattern, and as with all whittling projects, use a jig saw or a band saw to cut away surplus wood, in order to save time.

NAUTICAL STYLE BOOKSTALL

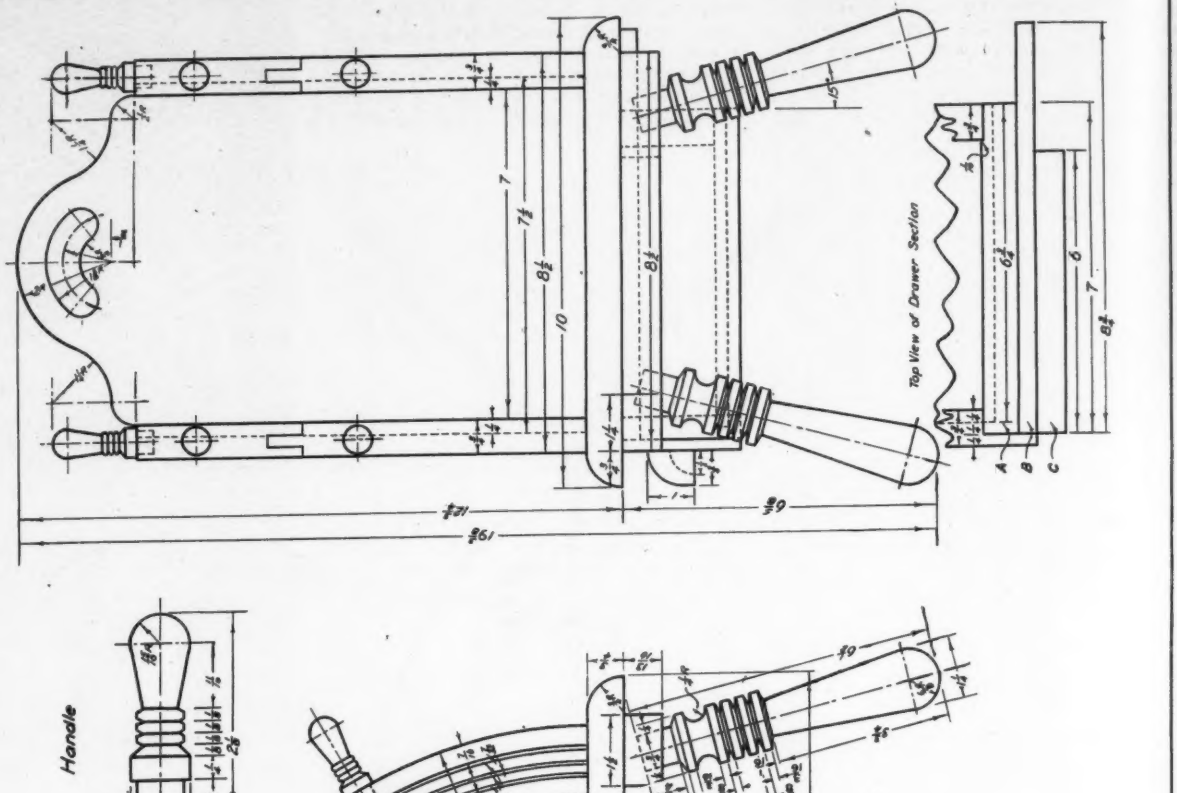
LAWRENCE G. LINDAHL

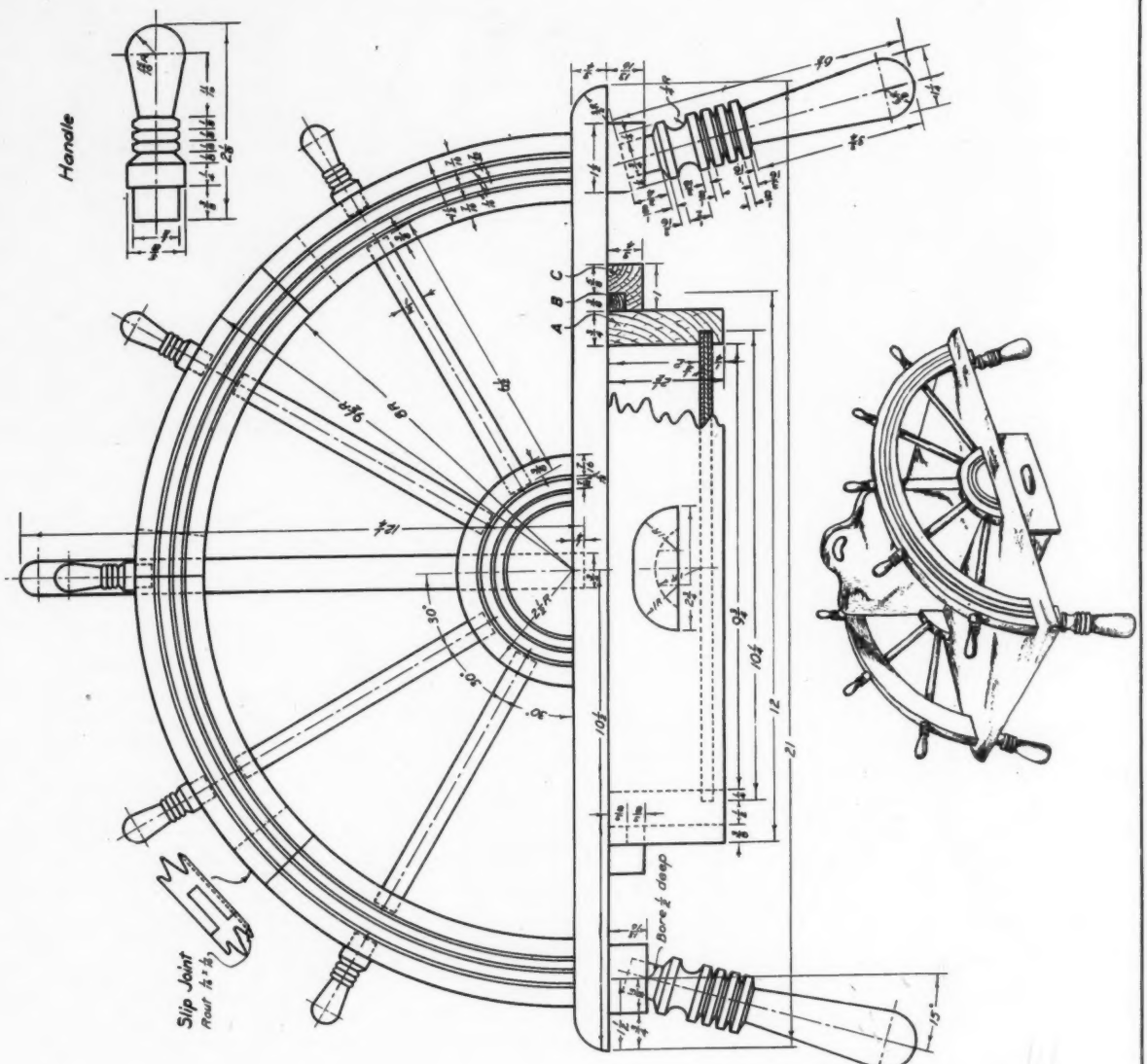
Head of Industrial Arts
State Teachers College
Chadron, Neb.

The nautical style bookstall described here was made in a second-semester wood fabrication class of college students. The purpose of the course, from the teacher-training standpoint, is to acquaint the students with the power machines and to give prospective teachers, or those who may work in industry, an insight into the manufacturing method as contrasted with the building method of producing an article.

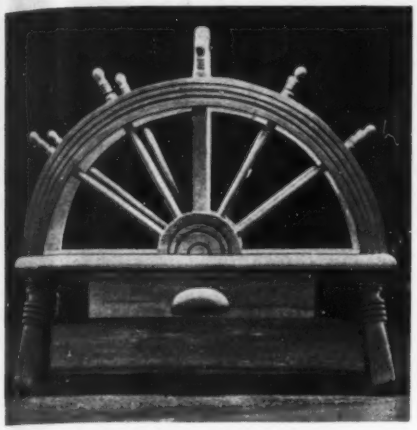
To start the work, one of the three best students is appointed as chief designer and shop superintendent. Another is made machine foreman, and the third becomes the inspector. These three keymen are held responsible for the completion of the class

NAUTICAL STYLE BOOK STALL





Details of nautical style bookstall



The bookstall completed

project and for the organization of the entire work. The chief designer is then set to work making the working drawings, deciding on the construction sequence and how the work is to be undertaken.

The machine foreman picks the workers for the necessary machines and supervises the setups on each one. Also with the aid of the other two men he designs and makes the necessary jigs and fixtures.

The inspector supervises the getting out of the stock. He inspects each piece as it is finished, and keeps a record of time spent by each student, and the material used, as well as other necessary details.

The instructor's job is to teach three students first and then see that they teach the rest of the class. The instructor is director of the whole thing and sees that his purposes are realized. He must be acquainted with manufacturing methods and be a good organizer himself in order to drill the students in management of men and tools.

The question may be asked why the superintendent of construction gets the assignment of making the working drawing. It is necessary that he does this because an attempt is made to get a problem that has not been made before. The superintendent, therefore, is required to design the project and to make the working drawing. This he does outside of school hours. Later on he also makes an individual booklet for each class member which contains a blueprinted cover, reduced working drawing, bill of material, construction sequence, time sheet (which contains the amount of time spent by each student on the job), class roll and organization for production, and a summary of reactions by class members. One of these booklets and one of the finished products is given to each class member when the project is completed. Since no one student has built a complete product and each is the result of group effort, numbers are placed on the completed projects and corresponding numbers are placed in a box. Then the students draw for the projects. This lottery adds interest in the disposal of the finished jobs.

Details of nautical style bookstall

TOOLMAKER'S CLAMP

EARL G. DARBY

Kansas State College
Manhattan, Kans.

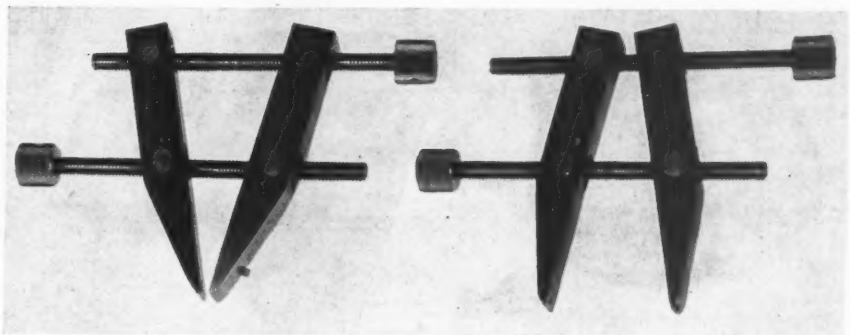
A toolmaker's clamp which has the advantage of clamping at various angles instead of only parallel is a very suitable project for the machine shop. The power tools required for such a project include a metal-turning lathe, a shaper, and a drill press. A milling machine is desirable but not necessary.

The finished clamp or a pair of them will make a valuable addition to the home shop, the machine shop, or to a mechanic's private kit.

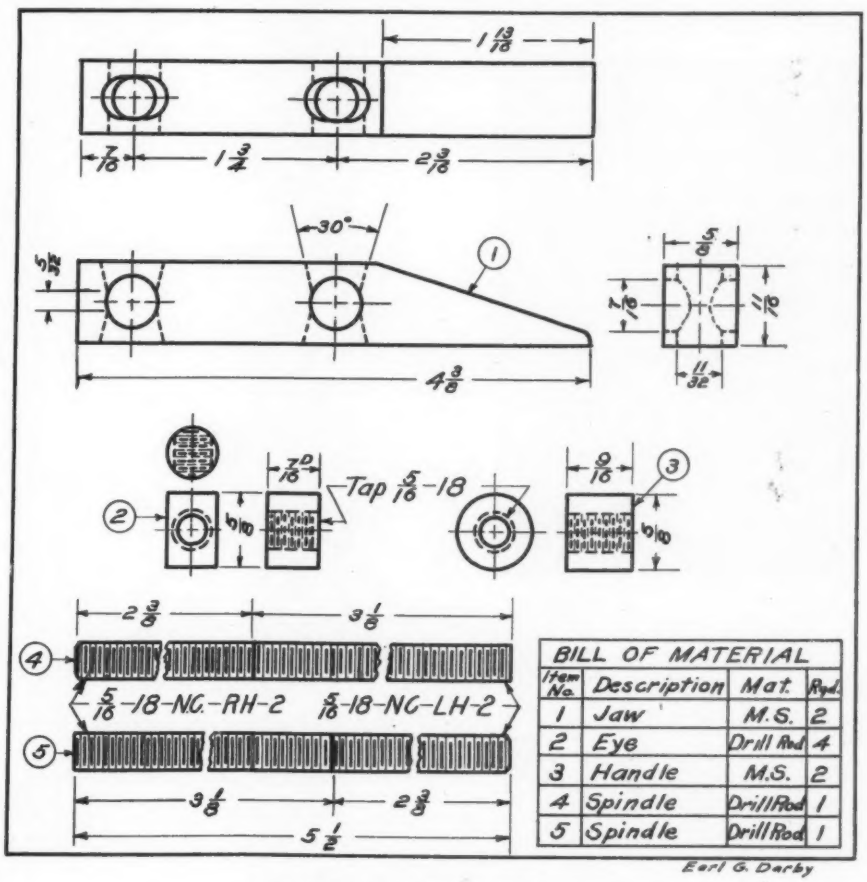
In making the clamp a beginning should be made on the jaws. Select ¾-in. square material of the required length. Clean the surfaces thoroughly and paint with copper sulphate solution. Lay out accurately and center-punch the centers for the holes into which the eyes fit and through which the spindles operate. Accuracy in the layout is very important for an easy working finished product.

Chuck a clamp jaw in a 4-jaw chuck using a center indicator to assure getting the center of the hole at the center of the chuck. Using a 3/8-in. drill supported in a drill chuck in the tailstock, drill a hole through the jaw. Enlarge the hole with a boring tool until a 7/16-in. drill rod will enter the hole with a sliding fit. Drill and bore the other three holes in the same manner. These four holes will receive the four threaded eyes which are made of 7/16-in. drill rod.

On the remaining faces of the jaws drill 11/32-in. holes at the center-punch marks. This drilling may be done on the drill press. If a milling machine is available, the angular openings for the spindles should be milled at the required angle using a 5/16-in. end mill. If a milling machine is not available the holes may be filed to the required shape and angle by using a round file.



Toolmaker's clamp



BILL OF MATERIAL

Item No.	Description	Mat.	Req'd.
1	Jaw	M.S.	2
2	Eye	Drill Rod	4
3	Handle	M.S.	2
4	Spindle	Drill Rod	1
5	Spindle	Drill Rod	1

Details of toolmaker's clamp

Select a 7/16-in. drill rod for making the eyes. The eyes should be laid out ¾ in. long to allow for cutting to the finished length later. Lay out and center-punch for the holes. Drill ¼-in. holes at the center of each section, taking care that the hole is centered through the drill rod. After drilling, two of the sections should be tapped with a 5/16–18 right-hand tap and the other two with a 5/16–18 left-hand tap. Care should be taken to assure the taps being at right angles to the drill rod in all respects.

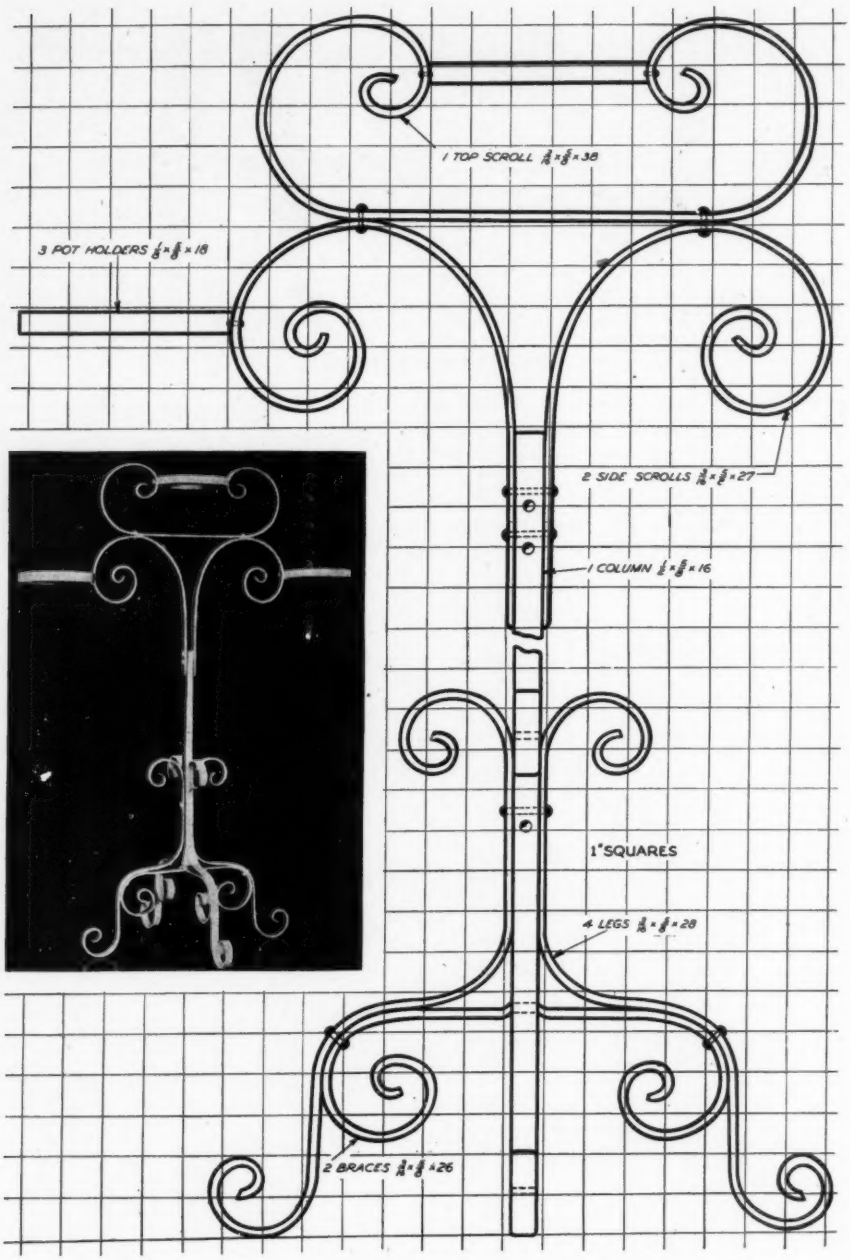
Select 5/16-in. drill rod for the two spindles. Their length should be about ¾ in. longer than the finished piece. This is for the purpose of removing the center drilled ends after cutting the threads. Mount a piece in the lathe and set the machine for cutting 18 threads per inch. Note from the drawing that both right- and left-hand threads are cut on both spindles, and that each right- and left-hand section is not the same length. Cut the threads, using one of the threaded eyes as a test nut. The fit should be a class 2 fit.

A piece of ⅝-in. diameter mild steel should be selected for the handles. It is chucked in a three-jaw chuck with the tailstock end supported by the tailstock. Knurl with a medium knurl a length sufficient for both handles with allowance for the parting tool cut, and also for cutting off the end with the center drill hole. After knurling, drill a ¼-in. hole lengthwise of the knurled section. Face off the right-hand end until the center drill hole disappears. Round the end slightly with a file. Cut off two sections for the handles and tap with a hand tap. Note that one handle should be tapped right-hand, and the other left-hand threads.

Place the jaws of the clamp in a shaper and plane off the outside and inside faces to the 11/16-in. dimension. Care should be exercised in clamping to assure a parallel cut. These faces will be the ones with the oblong holes. Remount the jaws and plane the tapers on them.

In assembling the clamp, first insert the eyes in the jaws with the right-hand threads in one jaw and the left-hand threads in the other. Screw the long threaded end of both spindles into their respective eyes a short distance before starting the short threaded ends in their respective eyes. You may have to try this several times before getting the distances adjusted so the jaws will clamp clear together before the division between the right- and left-hand threads reaches either eye. After the adjustment is made screw on the two handles such a distance that the short threaded ends of the spindles cannot come out of their eyes when the clamp is open to its maximum. Drill a 1/16-in. hole through each handle while in place and drive in a pin, thus locking the handle on the spindle.

Place the assembled clamp in the shaper and plane both sides to the finished dimension of ⅝ in. Break all corners with a file and finish with emery cloth to make a smoother looking clamp.



Flowerpot holder designed by R. A. Tomkiewicz, Milwaukee, Wis.

FOUR UTILITY ECONOMY DESKS

JAMES MC GREGOR

Polytechnic Elementary and Junior High School
Pasadena, Calif.

Size of Desk: The four desks described in this article are large enough to be useful, yet small enough to fit into the room of the average boy. Generally there is not sufficient space in the average home for a full-size office desk.

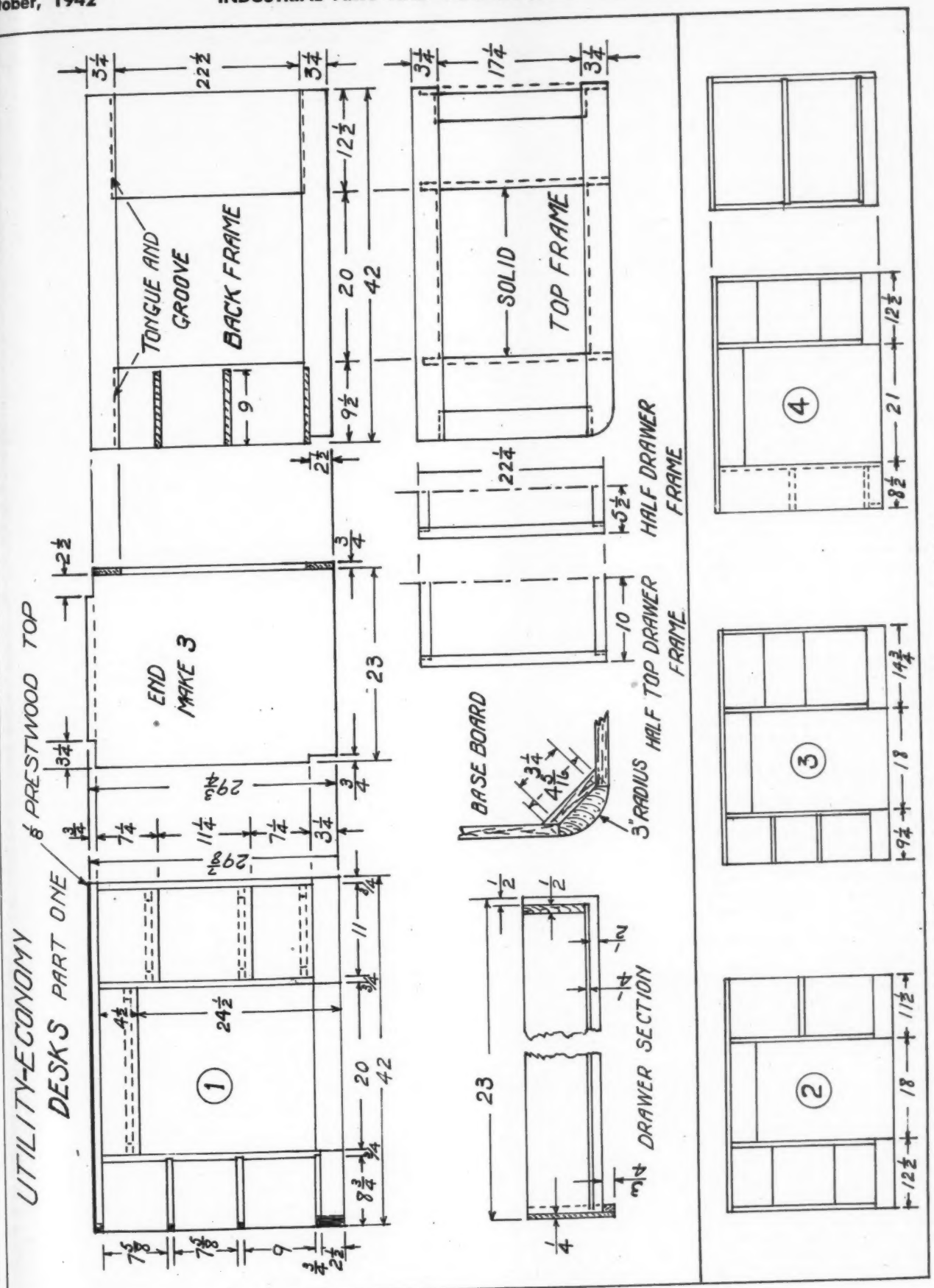
Desk No. 1: The top is frame construction made like a cupboard door without panels, using tongue-and-groove or dowel joints. The reason for not making the top solid all the way over is not just to save a few pennies, but rather to achieve better construction. To fasten the top down into the end grain of the sides is poor, but to fasten the sides to the edges of the top frame is sound.

The back is also frame construction. For those who do not have time to do this, a sheet of ¾-in ply panel 29¾ in. by 42 in. may be substituted. This material will stand the cutting of dado or housed joints to receive the end shelves.

Ends or sides of desk are glued up from ¾-in. material to form a width of 23 in. Notches are cut in these to receive the top frame and baseboard.

Drawer frames for sliding the drawers on are jointed at corners with tongue-and-groove or with dowel joints. By making frames such as these the work of assembling the desk is considerably simplified. These frames, too, when secured in place prevent the wide material in the desk ends from warping.

If a circular-saw dado is not available for cutting shelf joints on the left side of the desk, these may be cut very simply by hand. After marking out the dado or housed joints, a strip of lightwood lightly nailed across the left end of the desk and to the line of the



Four designs for economical desks

joint will form a stop and a guide for the blade of the saw. The waste material can then be removed with a chisel, and a uniform depth made with a hand router.

Assembly: The back frame, left end, and the three shelves can now be taken as the first stage in assembly. Use three screws through the back frame into the end, and glue, clamps, and a few nails for the shelves. Shelves are rounded to a 3-in. radius at the front left corners.

The baseboard is built up to conform to the curve of the shelves.

The three drawer frames are screwed from the inside into the two right-hand ends of the desk, six screws to each frame. These frames are located ¾ in. above the bottom edge of each drawer front. This is to avoid the showing of a rail in the front of the desk, and eliminate edges and corners which catch dust.

This second assembly of drawer frames and the two ends is slipped in place against the back frame, where six screws through the back frame into the edges of the ends, hold it in place.

The top frame is now ready for placing. All that has to be done here is to screw through the ends into the edges of the frame.

Top middle drawer frame may now be screwed in place.

Drawers are made in the usual way, but without dovetails. Bottom edges of all drawer fronts, it should be noted, project ¾ in. below bottom edges of drawer sides. This is to cover the front rail in drawer frame or drawer slide.

A ⅛-in. piece of tempered Prestwood is well glued and clamped on the top frame, to form the finished top. It is unnecessary to add any finish to this material.

A light ivory enamel finish, with dark brown plastic handles gives a conservative and distinctive color contrast, which fits into almost any surrounding. One coat of shellac over the woodwork of the desk will form a base for two finish coats of enamel. This will not cover as well as a prime coat of flat white, but will help to cut down on the amount of material used in these times, when cutting down is a necessity.

Desk No. 2: This is a left-hand desk. Whether selecting a left or right-hand design will depend on the person using it and also upon the space it has to occupy in the home.

There are only two shelves on the right-hand side in this case. This is again a matter of choice. Filing of papers or folders in desks one and two is done at right angles to the drawer fronts.

In desk No. 2, the shelves are wider and the kneehole smaller.

Desk No. 3: This one is designed to file papers and folders parallel to drawer fronts, giving more filing space. In cutting down the kneehole to 18 in., as has been done here, the size of the individual has to be considered. For many, 18 in. will be large enough.

Desk No. 4: There is no rounded 3-in. radius corner at left front edge of this model. The shelves to the left are enclosed like a bookcase, and will take the average encyclopedia or other good-sized books. Although not as good looking as the others, this model is a useful one where it can be placed in or near the middle of a wall, so as to allow easy access to the books.

Whether you place the deep filing drawer at the bottom next to the baseboard is a matter of opinion. The deep filing drawer at the middle of the desk is in a very handy position.

Bill of Material — No. 1 Desk

No. Required	*Name*	*Material*	*Size*
4	Back and top frames	Pine	¾ x 3 ¼ x 42
2		Pine	¾ x 3 ¼ x 18
1		Pine	¾ x 9 ½ x 23¼
1		Pine	¾ x 12 ½ x 23¼
1		Pine	¾ x 20 x 18
3	Shelves	Pine	¾ x 9 x 23¼
1	Baseboard	Pine	¾ x 3 ¼ x 11
1		Pine	¾ x 2 ½ x 20¾
1		Pine	¾ x 2 ½ x 6½
1		Pine	¾ x 2 ½ x 4 5/16
1		Pine	1½ x 4 5/16 x 2½
3	Ends	Pine	¾ x 23 x 29¾
1	Top	Tempered Prestwood	⅛ x 24 x 42
8	Drawer Frame Slides	Pine	¾ x 1 ¼ x 22¼
6		Pine	¾ x 1 ¼ x 9
2		Pine	¾ x 1 ¼ x 18
1	Drawer Fronts	Pine	¾ x 4 ½ x 20
2		Pine	¾ x 7 ¼ x 11
1		Pine	¾ x 11 ¼ x 11
2	Drawer Sides	Pine	½ x 3 ¾ x 22¾
4		Pine	½ x 6 ½ x 22¾
2		Pine	½ x 10 ½ x 22¾
1	Drawer Backs	Pine	½ x 3 x 19½
2		Pine	½ x 5 ¾ x 10½
1		Pine	½ x 9 ¾ x 10½
1	Drawer Bottoms	Douglas Fir Ply Wall	¼ x 19 ¼ x 22
3		Douglas Fir Ply Wall	¼ x 10 ½ x 22

MODERN PROJECTS

EMERSON WM. MANZER

Bronxville, N. Y.

A very popular project among students at this time is the knitting box used for toting yarn, knitting needles, and unfinished work. It is made of cardboard tubing which can be purchased in 9- and 10-ft. lengths with diameters of 5 or 6 in. The walls of the tubing are approximately 3/16 in. thick. The tubing may be purchased from window display houses.

Cut the tubing into lengths of 14½ in., or other desired lengths, using a circular saw. Sand edges and coat with shellac to seal the cardboard. Make a pattern of 1/16-in. cardboard and wrap it around the cylinder to determine the amount of 1/16-in. covering stock required. For the covering, sheet cork, or if that is not available, tough paper cover stock, or suitable paper board may be used. Cut the covering stock to the pattern and cover one side of it with synthetic glue.

Then wrap the cover around the cylinder and hold it in place with strips of scotch tape. Remove any glue while it is still soft. The covering stock may be cleaned with a safe cleaning fluid or with lacquer thinner and a clean cloth. Sandpaper may destroy the surface of the cork or other material that has been chosen.

The cover and the bottom of the knitting box are made of wood. Use ¾-in. stock and rough cut the disk so that it can be turned to the proper diameters. The sketch in Figure 1 shows how to set up the lathe so that the two diameters can be turned at the same time. The shoulder corner of the cover should be rounded to permit the cover to fit without too much forcing.

The hole in the cover is used for yarn or it may be used for a cord knob similar to the cord used for the handle. If the hole in the cover is to be used as a *yarn exit,* the edges should be rounded slightly.

The handle of the knitting box may be made of colored cord such as curtain cord, cotton rope dyed to match the design coloring, or colored braided cord. Knots tied at the end of the handle cord will prevent it from coming out of the hole.

The design on the box may be stenciled on the cork or other covering material, or it may be an overlay cut from scraps of the 1/16-in. covering material. Initials personalize the box and add considerably to its attractiveness.

Table mats made from cork or heavy paperboard are also practical and acceptable in the home. They provide ample opportunity for the student to create his own design and to produce a project within his interest span. Individual mats with coasters to match make interesting gifts.

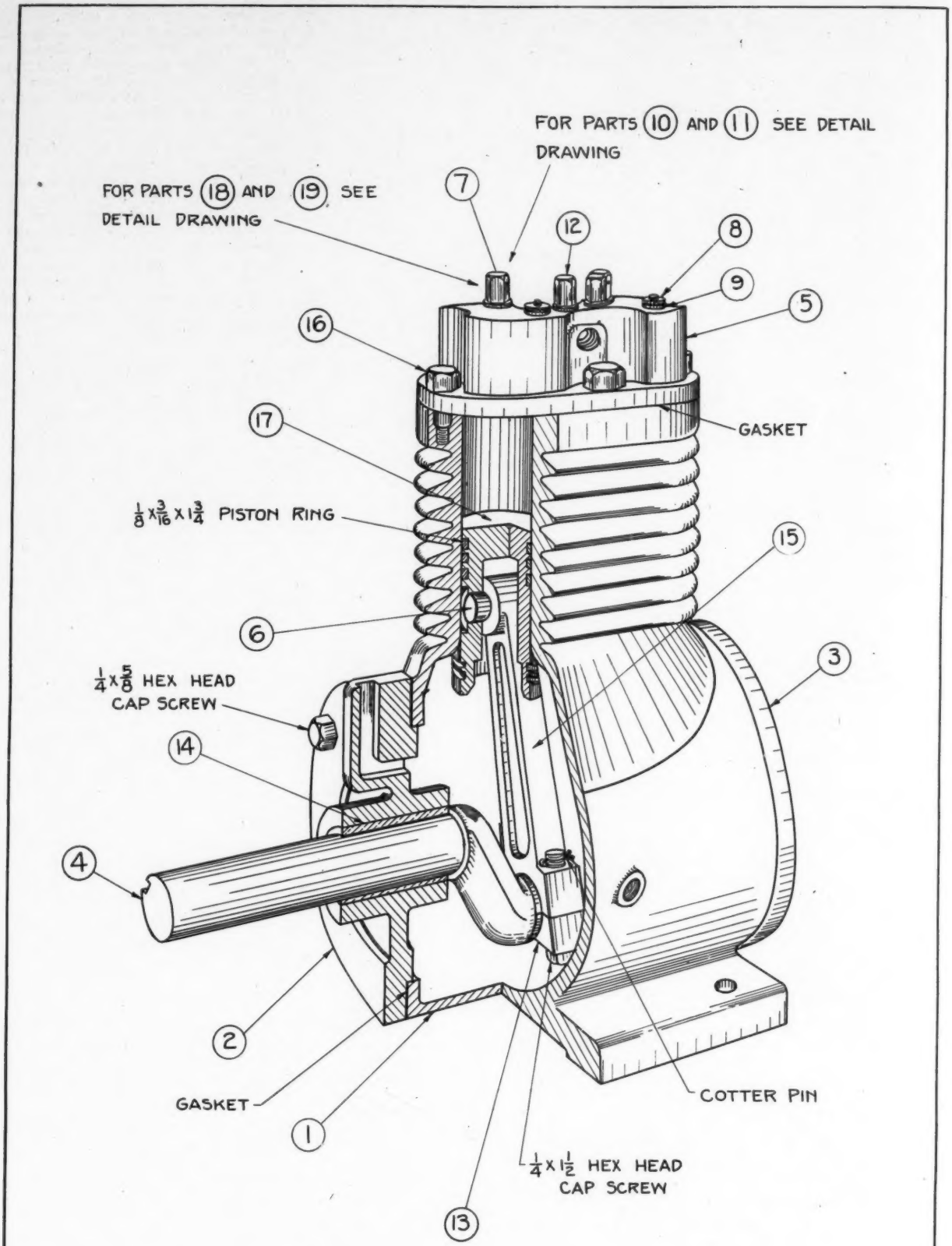
The designs may be stenciled on the mats. Cut the stencil from regular stencil board, using a sharp knife. Place a small amount of leather enamel on a glass jar cover and dip the end of a stencil brush into the enamel. Rub the brush on a piece of scrap paper to distribute the color on the brush. The enamel must be of proper consistency. Thin enamel will run under the edge of the stencil and smudge the outline. A small shoe-polish dauber, such as may be bought at the dime store, may be used as a stencil brush. Cut the ends of the long bristles so that they will be stiffer. Move the brush in a circular manner when applying color. It is best to have several brushes for each color.

Keep the brushes in small glass jars containing sufficient thinner to cover the brush. Before using the brush be sure to wipe out all thinner so that the color will not be thinned too much from the contents of the brush.

During the process of stenciling it is quite probable that a few traces of color may appear on the edges or surface of the mat. Such excess color may be removed with a little thinner and a clean cloth.

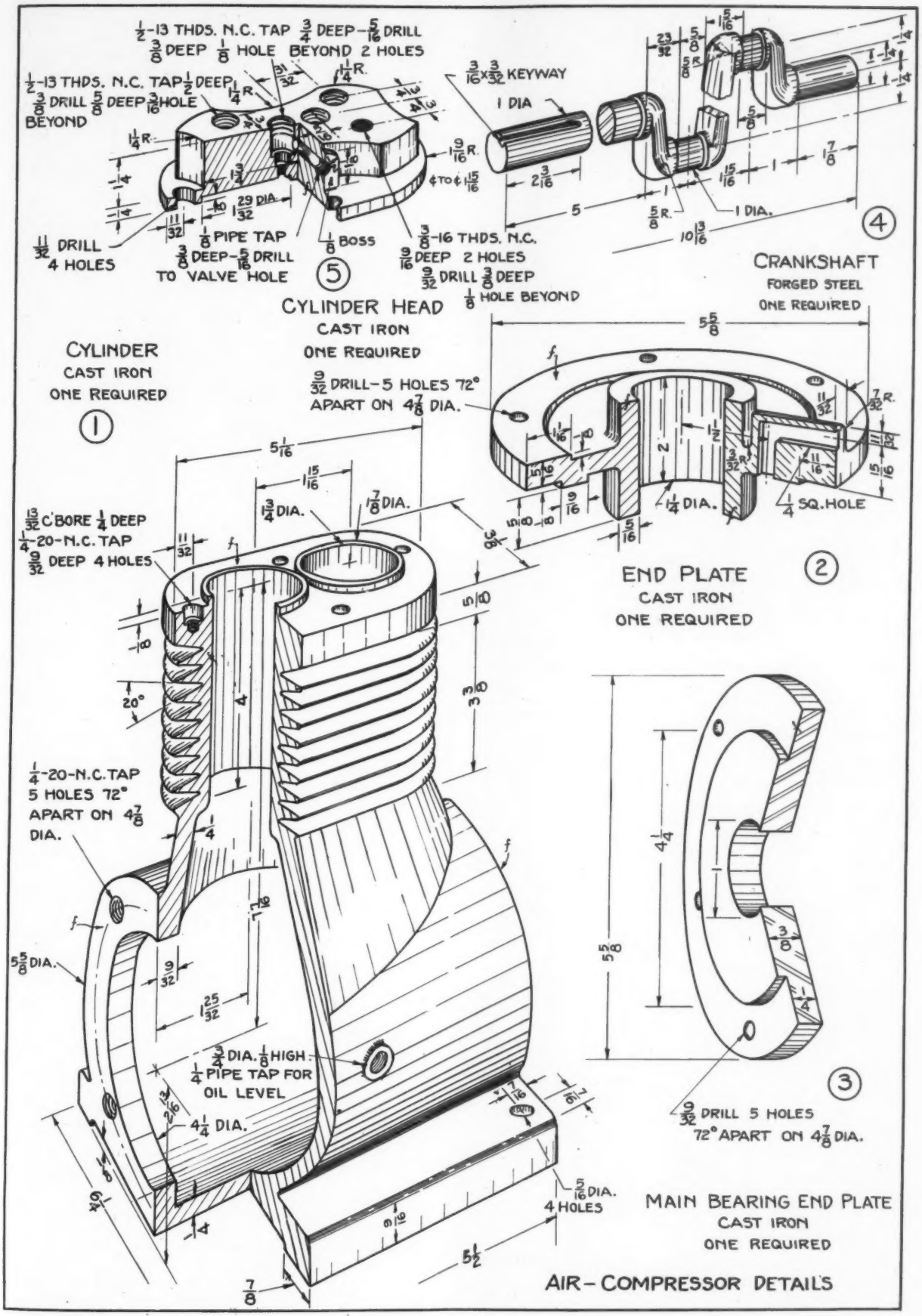
(Illustrations on page 351)

A popular government without popular information or the means of acquiring it, is but a prologue to a farce or a tragedy, or, perhaps, both. Knowledge will forever govern ignorance; and a people who mean to be their own governors must arm themselves with the power which knowledge gives. — *James Madison*



AIR - COMPRESSOR ASSEMBLY

Air-compressor assembly by Frank E. Anthony, Technical High School, Erie, Pa. For description see page 331.



Air-compressor details by Frank E. Anthony, Technical High School, Erie, Pa. For description see page 331. Another sheet of details will appear at a later date

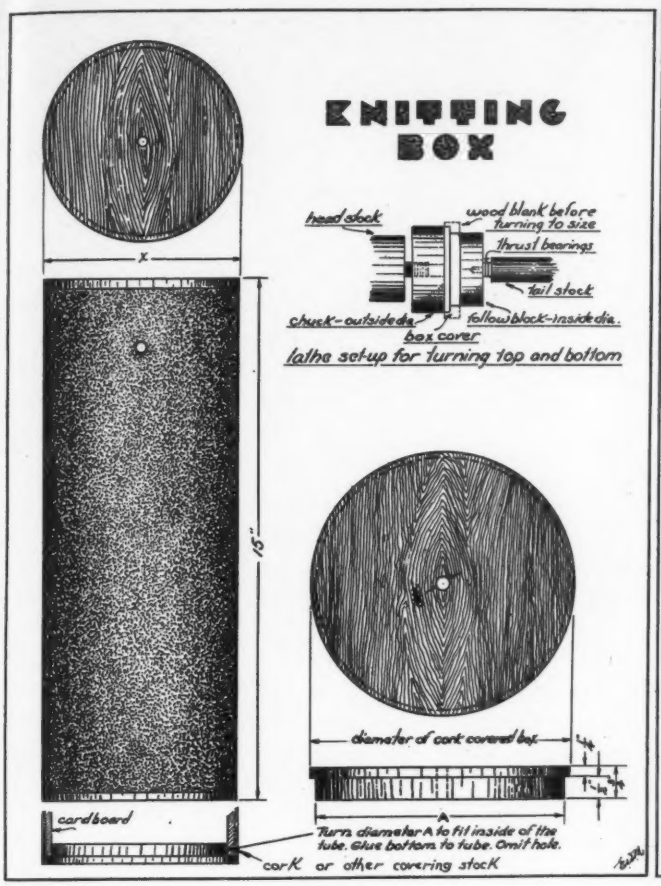


Fig. 1. Knitting box

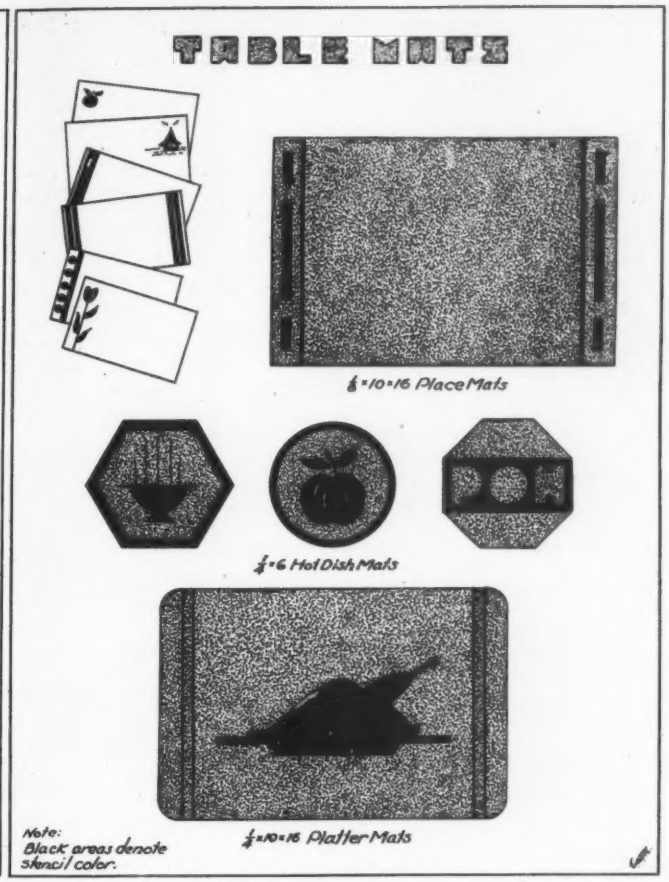


Fig. 2. Table mats

(For description see page 346)

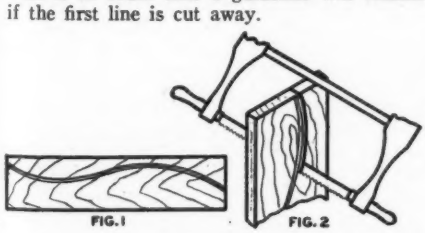
TO CUT CURVED EDGES

P. S. BURNS

Seattle, Wash.

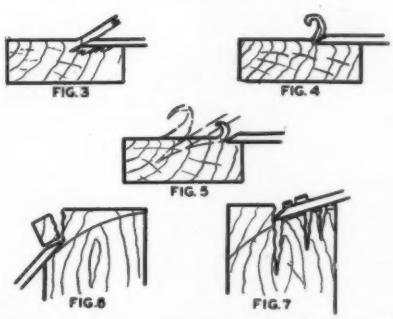
The greatest difficulty in working curved edges is that frequently there is no distinct line to follow. The lines are very often worked in freehand and vary from a sharp line to an array of indefinite lines. It is a good rule to be sure that there is a sharp, distinct line to follow, whether it is drawn freehand or mechanically.

It is well to mark the curve with two lines; one in the correct position and the other about 1/16 in. inside as shown in Figure 1. This is in order that a guideline will remain if the first line is cut away.



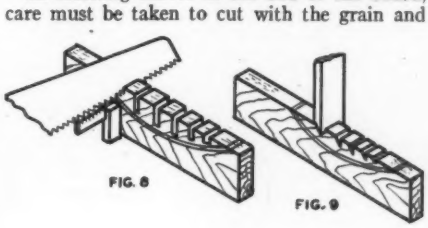
If there is very much material to be removed it is well to use a narrow-bladed saw such as a compass or turning saw, and cut about 1/16 in. outside the line as shown in Figure 2. The coping saw is always used for thin pieces and very sharp curves. (Finish as when cut by a chisel which is described later.)

When using the chisel, remember not to



place the hand directly ahead of the cutting edge at any time. In cutting against the grain of the wood the fibers splinter ahead of the cutting edge of the chisel, leaving a rough surface. It is also very difficult to follow a definite line. See Figure 3. In cutting with the grain the fiber of the wood is cut before being turned up by the bevel of the chisel, leaving a smooth surface, and making it easy to follow a definite line. See Figure 4.

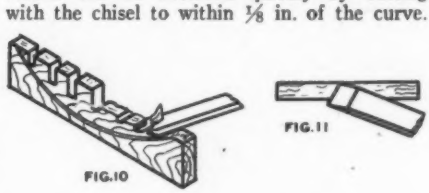
In chiseling curves at the end of the board, care must be taken to cut with the grain and

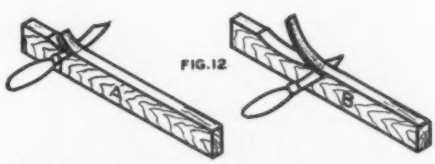


not against it. Figure 6 shows the correct method and Figure 7 shows the incorrect method. Results of each method are shown.

To use a chisel and a crosscut saw for cutting curves, make several cuts on the edge of the board about ½ in. or so apart (the distance apart of these cuts depends upon the sharpness of the curve and the nature of the grain of the wood), and make the saw cut to within ⅛ in. of the marked curve and be sure that the saw is held at right angles to the face side of the piece as shown in Figure 8.

If the curve is not very deep the same results can be obtained quickly by cutting with the chisel to within ⅛ in. of the curve.





Hold the chisel about perpendicular to the edge and use a mallet for driving. See Figure 9. To remove waste material chisel in from the edges toward the middle of the piece

holding the bevel of the chisel down as shown in Figure 10.

After the waste material has nearly all been removed, use chisel and pare the surface; that is, hold the chisel at a slight angle to the work and cut with a sliding or shearing cut which is much easier to make and leaves the work smooth. See Figure 11.

This principle is applied when whittling, as shown in Figure 12, where the cut is started at *A*, sliding the blade sideways and pushing forward at the same time, as shown at *B* in Figure 12.

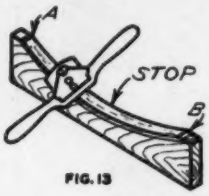


FIG. 13

FIG. 14

To cut curved edges

Use the spokeshave to finish down to line, cutting with the grain and working from edges *A* and *B* toward the middle as shown in Figure 13.

For cutting convex surfaces, hold the chisel with flat side on the wood and bevel side up. See Figure 14. The direction of the grain of the wood is sometimes a factor in deciding in which direction the cutting is to be done.

In larger pieces a drawknife can be used to good advantage, cutting with the grain and working from both sides to the lowest point as in Figures 15 and 16, using a sliding cut.

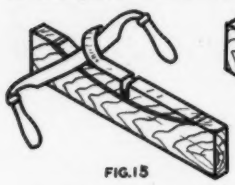


FIG. 15

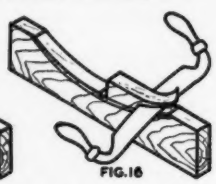


FIG. 16

In cutting convex curves in the end of large pieces it is well to use a turning or compass saw as first stated in Figure 2. Again, one can use a regular crosscut saw and saw the corners off as shown in Figure 17, repeating the exercise until it is down near the curved line as shown in Figure 18. Next use chisel and begin at outside edge, and chisel with the grain,

FIG. 17

FIG. 18

FIG. 19

FIG. 20

paring off edges again and again until the proper curve is cut. Either stand in a position so that you can sight along the flat side of the chisel as a guide for keeping it perpendicular to the face side of the work as shown in Figure 19, or use a square as shown in Figure 20.

A rolling cut is easy to make and leaves a smooth surface. Hold the chisel in a slant position, but at right angles to the face side as in Figure 21, position *A*. Next roll the chisel forward and at the same time press downward as in position *B*.

The average boy should take about a 3/16-in. cut for softwood, as in Figure 19, and about ¼ that amount for hardwood. Lay piece flat on scrap piece of board, and if possible, clamp both pieces together tightly. Chisel with the grain and not across it. In this way you are not as likely to splinter the edge of the board.

Always chisel from the line toward the waste material, then if the wood should splinter it will be in the waste portion. Chisel with the grain and not against it. See Figure 22. The correct method is to work from point *A* to point *B*.

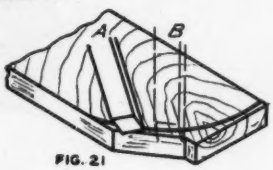


FIG. 21

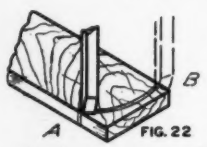


FIG. 22

FIG. 23

Small curves may be cut with a chisel as shown in Figure 23. Pare about ¾ the way across the piece and then reverse and cut from opposite side. This avoids splintered edges.

FIG. 24

A file can be used to good advantage to smooth or cut down small convex or concave curves.

Never use a file that does not have a handle. Always use both hands in filing. See Figure 24. In concave curves the file is held at about 30 or 45 deg. to the face side of the work. File with the grain. See Figure 25. If

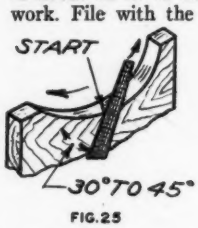


FIG. 25

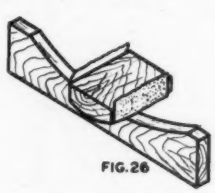


FIG. 26

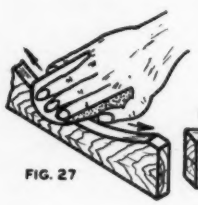


FIG. 27

FIG. 28

the file is held at right angles to the face side it may splinter out the opposite side.

Finish with sandpaper. It is well to round the sandpaper block a little so as to give more sandpapering surface as well as to prevent the sharp corners of the block from cutting through the paper. See Figure 26. If the pieces to be sanded are rather free from splinters one can hold the sandpaper folded over in the fingers, as shown in Figure 27. Motion is shown by arrows. Never sandpaper against the grain of the wood, as in Figure 28, if there is a possibility of splinters rising. The edge of the sandpaper might raise a splinter and the forward pressure would drive it into the finger with possible serious results.

HORN AS A HANDICRAFT MEDIUM

C. GLEN COOLMAN
Supervisor of Handicraft
H. C. LETSINGER
Instructor
Culver Woodcraft Camp
Wabash, Ind.

Seeking to extend a variety of mediums for general handicraft work at the Culver summer schools, the handicraft department has added horn to the list of basic materials.

From the beginning it has proved a very popular and fascinating addition. Fascinating, not only to boys, but also to their instructors who are enthusiastic in their work with this new handicraft material. The intense interest displayed in horn is in a measure due to its adaptability which makes it a practical venture.

Horn affords an opportunity for the handicraft program to widen the scope of their basic materials since it is one of the least expensive of the many materials available.

Unless one desires to go to extremes, the tool kit necessary to do satisfactory work with horn is very inexpensive. The following is amply sufficient to do most of the work by hand: files, cabinet scraper, hand drill (with bits to ½ in.), hack saw, coping saw, and vise. Other tools may be desirable but not essential. Of course, abrasives are necessary, but sandpaper, emery cloth, and pumice are sufficient.

Aside from this economic aspect, its ease of handling and cleanliness in workmanship are of vital importance to the teacher as well as the boy developing one of the many horn projects.

The fact that horn can be combined with other mediums to a good advantage is of extreme importance in measuring the value of this material. Among others, metal, wood, and plastics, will combine well with horn in making many projects. These materials complement each other and offer opportunities for variety.

Requirements for finishing horn are few, easily applied, and give excellent results. The various forms of wax or furniture polishes are very satisfactory for finishing this material. Linseed oil, used either alone or with shellac as a French polish, also gives pleasing results. These simple finishes eliminate the unsatisfactory condition common to finishing materials used in handicraft work.

The accompanying illustration shows some of the practical and desirable products made of horn. In the group are lamps, smoking trays, receivers, shoehorns, paper knives, powder horns, desk sets, decorative fish, etc.

Not only can satisfactory work be done by

Display of projects made of horn

small boys, but also the ability of the craftsman can be taxed if perfection is attempted.

Because of its ease and cleanliness of handling, its adaptability, and its ease of finishing, horn lends itself admirably to all types of handicraft programs, whether they be school, camp, Y.M.C.A., or recreational classes. It is a medium that will be welcomed by groups of all ages.

SHOPWORK AND NATURE STUDY

GEORGE A. SMITH

Supervising Principal
Quarryville School District
Quarryville, Pa.

The school shop affords a number of opportunities for the correlation of nature study with metal and wood working. Take, for example, a study of leaf designs in connection with shopwork. To begin with, it is interesting to know the place that the leaf design has had in the history of applied art. Quite likely its use can be accounted for because of its familiarity as a product of nature, and because of its graceful line composition. The history of the acanthus leaf and its application to architecture alone would provide interesting material for many volumes. Remove the acanthus leaf decorations from the superb Corinthian column, and this important architectural support will have lost most of its ornate beauty. The story goes that a native of Corinth received his inspiration for the Corinthian column when by chance he happened to notice acanthus leaves growing up around a discarded basket. Whether or not this story is true, it serves to create an interest in the Corinthian style of columns. Probably some early violin maker received his inspiration for his graceful violin scrolls from the beautiful symmetry of the uncoiling ostrich fern. Many an artificer has undoubtedly drawn from nature for design; and what is finer and more inspirational than the artistry of nature.

A firsthand interest in nature study and observation may be created in many ways in connection with general shopwork. Many projects such as book ends, necktie racks, trays, boxes, and the like, may be attractively decorated with native leaf designs cut out of thin sheet metal. The fact that a boy may have the experience of collecting a particular leaf that happens to meet his fancy from a near-by tree, creates an interest in the study of nature.

A book rack built of oak may be very pleasingly decorated on each end with an oak leaf design cut out of sheet metal, such as copper, for instance. This metal may be still more enhanced by oxidizing it to a deep russet color, which will very closely resemble an oak leaf in late autumn. The collected leaf specimen may be used as a template in tracing the design directly on the sheet metal. The design is easily cut out in the rough with tin snips, and then accurately finished with small files and emery cloth. In order to place veining lines on the design, it will be necessary to carefully observe natural veining in the leaf. The veining lines are easily indented into the metal design with a small cold chisel. The leaf design may then be oxidized to the desired russet color by merely placing it face up over a flame until the proper temperature is reached. The color on the leaf may be protected with a coating of lacquer or varnish. The finished leaf is easily attached to the book end with small copper brads.

Book rack embellished with an oak leaf design

GAS BLOWTORCH

C. W. BLAKESLEE

Hastings High School
Hastings-on-Hudson, N. Y.

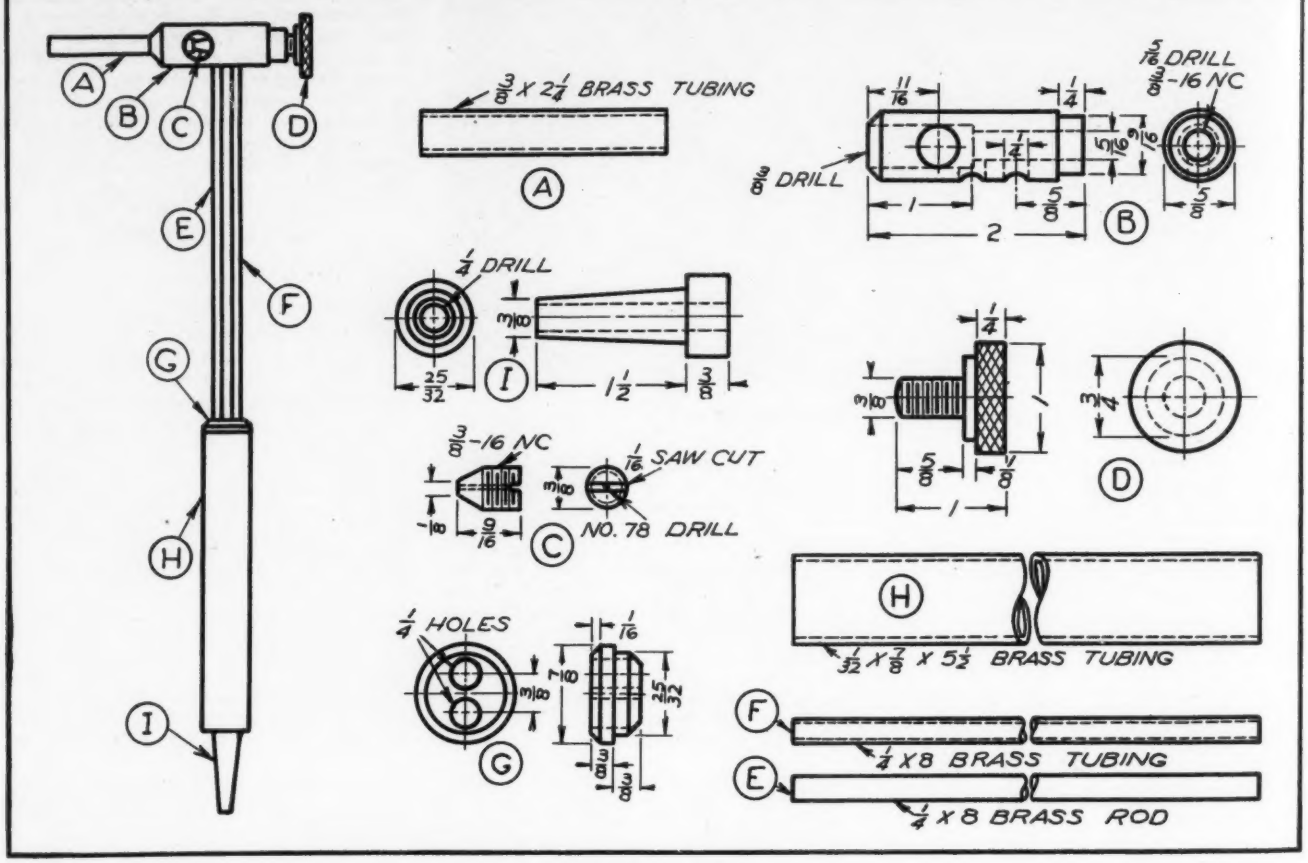
A gas torch capable of producing flame temperatures ranging from 650–1600 deg. F. and adjustable to intermediate heats between these limits has a wide range of uses in the school shop. The torch described requires only a connection to a source of gas supply to operate it. The operating temperature can be selected by the proper adjustment and location of the injector as shown by the charted data. The torch being adjustable within useful limits of temperature ranges will accommodate typical school-shop jobs such as preheating, soldering, sweating, drawing tempers, low-temperature brazing, etc. The torch is so designed that adjustments cannot be made unless the thumbscrew is purposely removed and the physical location of the injector changed by inserting a screw driver in its slot. This feature pre-

ADJUSTMENT DATA				
INJECTOR	FLAME	MIXTURE	TEMP.	OPERATION
ADVANCED		EXCESS GAS	650°F	POOR FLAME
RETARDED		EXCESS AIR	1300°F	GOES OUT
PROPER		MIXTURE OK	1600°F	BEST FLAME

NOTE: AFTER PROPER ADJUSTMENT IS MADE, INJECTOR MAY BE LEFT IN POSITION.

ORDER OF ASSEMBLY

1-SWEAT "E" & "F" IN "B." RETAP HOLE IF NECESSARY.
2-SWEAT "E" & "F" IN "G." SOLDER FROM UNDERSIDE.
3-SWEAT "G" IN "H." LET TUBES PROJECT 1" FROM "G."
4-INSERT "I" INTO "H." SOLDER WELL.
5-PRESS "A" INTO "B" AS SHOWN.
6-SCREW "C" IN "B" AS SHOWN. TIGHTEN "D" IN "B."



Gas blowtorch

vents any students from tampering with or making an adjustment to the torch without having a definite purpose or reason. Once the adjustment is made it remains fixed.

Practically all of the machine work involved in constructing this project is done on the lathe. The specifications and assembly order as shown in the illustration should be followed carefully. The soldering or sweating together of the various parts in the process of assembly must be very carefully done as these connections must be rigid and gas tight. It is recommended that all surfaces to be joined by solder should be cleaned thoroughly even before they are inserted or fitted together. The final assembly of the torch requires that the thumbscrew be turned into the barrel, and tightened sufficiently so that no gas will leak at this point. If the injector has been adjusted properly as shown by the chart diagrams, the torch will operate very efficiently as soon as it is ignited and no trouble will be experienced in the nature of flarebacks, or that the flame is extinguished.

The temperature data on the various adjustments was compiled by using a thermocouple and pyrometer and this data was used to determine the proper adjustment for most effective and efficient operation of the torch.

Besides having a real use in the school shop, this torch also has a utilitarian value in the home workshop.

CELLULOID ETCHING

ALBERT KOSLOFF

Industrial-Arts Laboratory
Waller High School
Chicago, Ill.

The writer's need for presenting a more varied program to pupils of graphic arts in an industrial-arts laboratory has been the chief motivation in writing this article. The celluloid etching process described here has proved interesting, inexpensive, and stimulating to first-year high school pupils. It is presented so that it may aid teachers of printing, art, industrial-arts laboratory, and general shop in teaching an interesting unit in their field and to offer another method of expression for the pupil in search of a hobby.

Etching is a form of intaglio printing. It is a process in which a design in the form of grooves or burrs is put into a very smooth surface. If a soft or damp piece of paper is pressed against the inked lines or grooves on the surface, the paper will draw the ink out of the grooves and the same pattern which was originally on the smooth surface will be transferred to the paper. This, basically, is the process of etching.

Ordinarily, there are two types of etching, acid and dry point. In the acid process, the lines in the copper or zinc etching plate are eaten out with an acid, while in the dry-point process the lines are scratched or cut with a sharp tool. Celluloid etching is a special form of dry point, in which celluloid instead of metal is used for the plate. It is not necessary to "be able to sketch in order to etch." One can make beautiful etchings from other etchings, drawings, photographs, or even snapshots with little effort.

Materials Required

The materials required for celluloid etching may be obtained from any big art shop or printing establishment or through advertisements in trade art magazines. Most of the

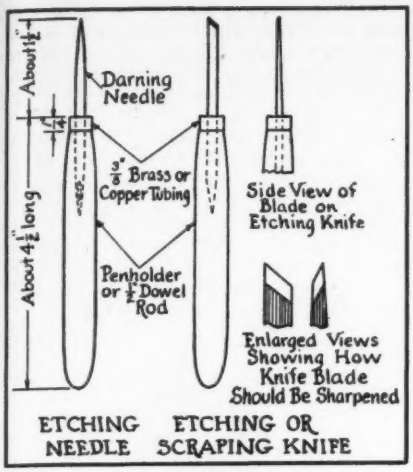

About 1"
Darning Needle
About 4½" long
3/8" Brass or Copper Tubing
Side View of Blade on Etching Knife
Penholder or ¼" Dowel Rod
Enlarged Views Showing How Knife Blade Should Be Sharpened
ETCHING NEEDLE
ETCHING OR SCRAPING KNIFE

Fig. 1. Etching tools

articles listed herein, may easily be made in the school or home shop. Those things bought are inexpensive. The following will be needed to carry out this process successfully:

1. *Benzine* to clean off the celluloid plate.
2. *Blotting paper* to dry the etching paper upon which the prints are made.
3. *Celluloid* that is transparent and has a thickness of .015, .020, or .025 in. Celluloid of this thickness is better than if it were thinner.
4. *Clean cloths* for dabbing the etching ink on to the celluloid plate and for cleaning and toning the plate.
5. *Drawing board* or any smooth-surfaced board.
6. *Felt pieces*. These may be obtained from felt blankets or from old felt hats.
7. *Etching ink*.
8. *Etching paper* or any soft, strong, unglazed, pliable book paper upon which the prints may be made. Even Mimeograph paper that has been prepared correctly for etching produces excellent results.
9. *Etching needle and etching knife*. These are the only two tools required to do celluloid etching. The needle may be made from a darning needle, from broken dental tools, parts of mechanical-drawing instruments, rat-tail file, or from center punches.

The knife should be ground somewhat like a skew chisel. It may be made from a small nail file, and should be sharpened on an oil-stone or whetstone.

A penholder or dowel rod will serve as a handle for both knife and needle. See Figure 1.

10. *Glass* upon which to mix the etching ink.

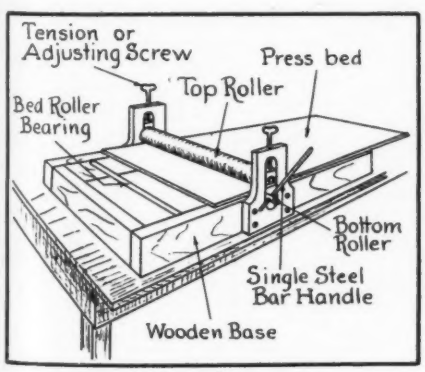


Fig. 2. An etching press

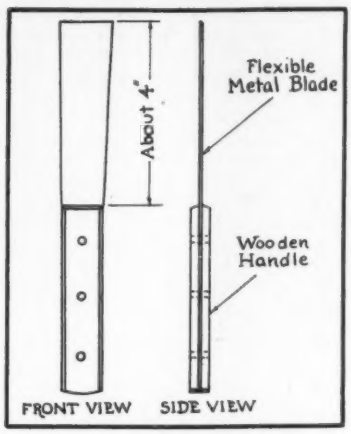


Fig. 3. Pallet knife

11. *Etching press* or an adjustable clothes wringer whose rollers are hard and are not impaired in any way. A good beginner's etching press may be obtained for as low as four or five dollars. Also, an instructor may make one like that shown in Figure 2.

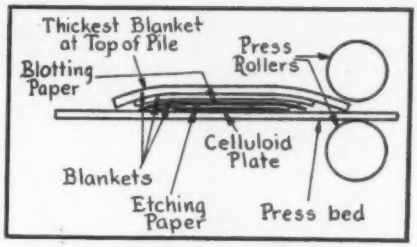


Fig. 4. Placing blankets when making prints

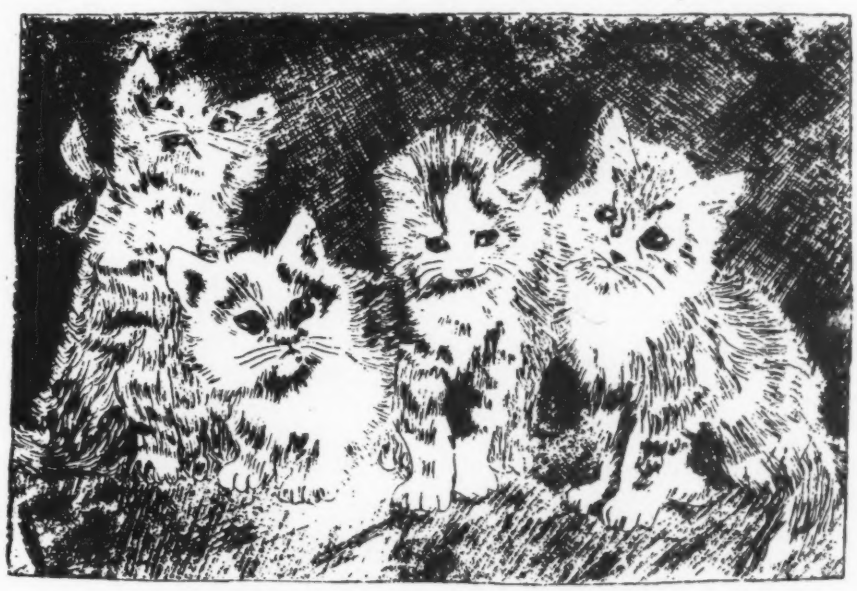
In this press, the top press roller has a gear attached to the end opposite the handle. When the handle is turned, the gear on the bottom roller, which engages the teeth on the upper gear, turns both rollers, thus causing the press bed to move.

12. *Plate oil* of thin or medium grade for thinning the etching ink.

13. *Ink knife* or pallet knife for mixing the etching ink. An excellent ink knife may be made from an ordinary kitchen knife that has a strong, flexible blade. See Figure 3. Grind off all sharp edges and corners.

Making Etching Prints From Celluloid Plates

1. Obtain a drawing or photograph to be used as copy or subject for your etching. It is advisable to use a simple drawing for the first etching plate. Those who draw well may do their etching directly on the plate without copying from a drawing. The outdoors, or parts of famous etchings offer good subjects.
2. Lay the picture to be etched face up on a drawing board or any flat board.
3. Lay a clean, unmarred piece of celluloid of correct thickness and large enough in width and length over the picture.
4. Fasten the celluloid and picture to the board with thumbtacks.
5. In tracing fashion, begin scratching or etching the celluloid with the etching needle and the etching knife. The needle is pressed at an angle and more force is put on it where



Dry-point celluloid etchings

heavy lines are necessary. To obtain shadow effects with the needle, crosshatch or crisscross lines carefully. The knife is used mostly in scraping fashion for shadow effects. If you have difficulty in seeing the lines, rub gently some ordinary ink into the scratched lines with your hand or a soft cloth. If more etching is necessary, wipe the ink off the plate carefully with a benzine cloth, and continue to etch until you believe the plate is finished.

6. After the plate is etched enough, remove it from the board and make it ready for inking by cleaning the plate gently with a soft cloth that has some benzine on it.

7. With a soft rag apply correctly mixed and thinned etching ink to the plate. Ordinarily, etching inks are too thick and stiff and must be thinned out with a few drops of oil called *plate oil*. For celluloid etching, thin and medium grades of plate oil should be used. The ink and the oil may be mixed on a piece of glass with an ink knife. Cover the entire surface of the plate with the mixed ink. Make sure that the ink is not too thin.

8. Next wipe the plate gently with a piece of clean, soft cloth. Hold a loose, ball-shaped piece of the cloth in one hand and move over the inked plate with a back-and-forth motion. Do not use any pressure in doing this. Carefully remove the ink from the surface of the celluloid, except the ink in the grooves and burrs that have been scratched with the needle and the knife, so that the etched subject appears. The way a plate is wiped determines how the print will look. Many times a print will be more beautiful if the plate is not wiped too cleanly.

9. Now tone the plate and soften the ink by rubbing very carefully on top of all parts of the plate which have ink on them with the heel of the right hand, holding the plate with your left hand. This gentle rubbing should continue from one to three minutes, depending on how much inked surface there is. Rubbing the plate aids in softening the ink so that it will adhere to the paper.

10. After you feel that the plate has been rubbed enough, place it in the middle of the press bed and lay a sheet of etching paper or unglazed book paper that has been prepared for printing directly over the inked and toned plate. Before printing, the paper must be prepared by being soaked in water and allowed to dry between blotters until the paper is pliable and barely damp when used for printing. The prints will not be clear if there should be particles of water on the paper.

Be careful not to smudge the paper in laying it over the inked and toned plate. Place blotting paper over the etching paper. On top of the blotting paper lay three or four pieces of felt to obtain enough smooth pressure for running the plate through the press. If there is a thicker piece of felt in the pile, it should be at the top, as the thicker piece has less tendency to wrinkle. See Figure 4.

11. Run the plate, paper, blotter, and felt through the rollers of the etching press or clothes wringer slowly. An etching press consists of a frame which holds two hard metal rollers, one above the other, between which a very smooth piece of flat metal or press bed is made to move. One of the rollers, either the top or bottom, has a handle attached to it for turning the rollers. The pressure on the press is great and should be tested for the first plate by running an uninked plate of the same thickness as that being etched, using a soft blotter upon which to make the impression and then noting how well the etched lines appear on the blotter. The pressure must be adjusted before actual printing is begun.

12. Seeing one's first print after the celluloid plate has been given an impression, is the most thrilling part of etching. Remove the felt and blotting paper and carefully lift off the etching paper. Behold! A work of art — that is, if the plate has been carefully made.

13. Fasten the prints down on all sides to a flat surface with thumbtacks. It is advisable to do this, as the paper has a tendency to shrink in drying.

14. Every time a print is made, the plate must be inked, wiped, toned, and covered with paper, blotting paper, and felt and run through the press. When the etcher has finished with a plate it should be wiped off with a benzine rag so that no ink is left in the grooves because it is difficult to remove the ink after it has dried. A celluloid plate in which the lines have been neatly scratched and cut should print easily from twenty to thirty etchings. When the lines become too light the plate may be etched over. The etchings may be mounted in frames which presents another creative effort on the part of the pupil in designing and constructing.

Dry-point celluloid etchings

CARVE A HORSE

HOMER C. ROSE
Teacher Trainer
Armored Force School
Fort Knox, Ky.

Whittling is such a national pastime that most of us have a little skill, although it may have lain dormant in the finger tips for some time. Sharpen your knife and a chisel or two and carve a horse. The finished pony, having cost much in time but little in cash, will become almost a pet in your home. Here is one way to do the job:

Make some sketches. At least three views should be carefully worked out. See Figure 1. A stance with all four feet on the ground makes a strong carving. Don't let that stop you, however, if your taste runs to bucking broncos. They can all be carved. Horse lovers will want to study the breeds and carve a thoroughbred.

Select the wood. Walnut, cherry, or mahogany make beautiful wood carvings. White pine, poplar, or brasswood carve more easily than walnut and cherry and can be finished with a pleasing color, but they lack the distinctive grain.

Build up a block of 1-in. wood to the required dimensions, using good synthetic glue or the reliable fresh animal-hide hot glue.

Of course, you will want as nearly perfect joints as can be made. Solid material may be used.

Glue the sketches on the wood block in proper relationship, and saw to the line. Coping, turning, jig, or band saw may be used. The base shown in the photograph may be added after the carving is finished.

Draw heavy pencil lines on the profile or high points in all views to remind you not to carve on these points. Carefully whet your tools on a fine stone and start to carve. Small chips should be removed from the square corners left by the sawing. Work around the horse, taking off a little as you go. Do not attempt to finish one part at a time, but carve the shape as a whole.

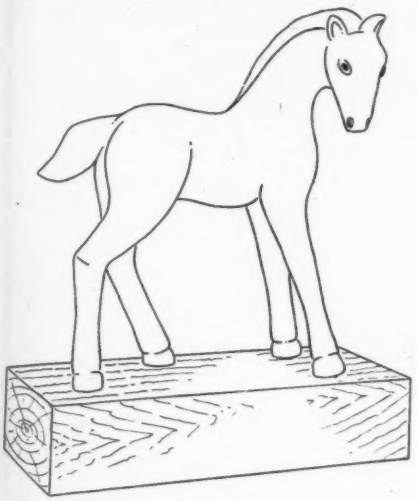


Fig. 2

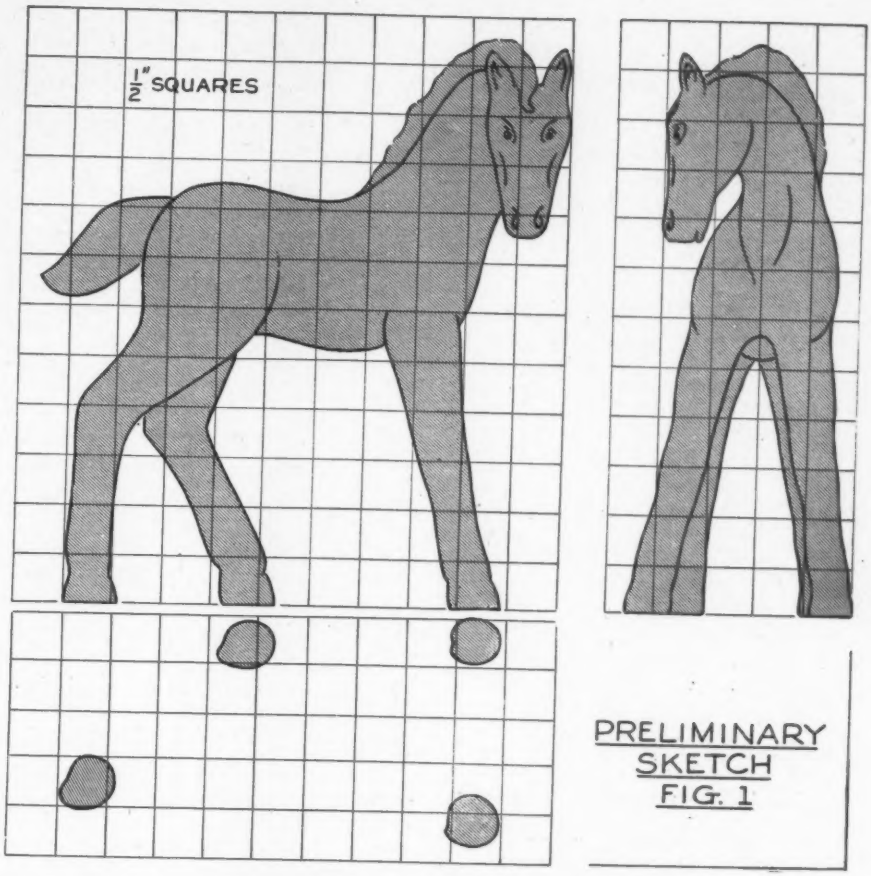


Fig. 1. Making a sketch of the horse

Fig. 3. Pony colt in black walnut*

*Shutter-bug note: Enlargement made with two exposures, one negative of horse with white background and the other of unfinished walnut stock.

Fig. 4. Carved horse and modern candleholder in walnut

The roughly sawed piece may be glued temporarily to a softwood block that can be held in the vise, as shown in Figure 2. If you break the glue joint between the hoofs and the block you are trying to take off too much at a time. Small chips ⅛ in. in length are large enough. Work with the grain.

Carving is for fun. Do it when you have time to enjoy it; take it along on a vacation, or work on it evenings just as a pasttime. The colt shown in Figures 3 and 4 was carved on a vacation trip.

When your horse has taken form, and all the details are completed, you are ready for final touches. If the tool marks give your horse character, you may prefer not to sand them out. If you sand the wood be sure to finish the carv-

ing first, as the abrasive left in the wood will dull your tools. Use coarse paper at first, and then finish up with a fine grade.

Square up stock for the base, and trace the horse's hoofs on their proper locations. Carve the base if desired, leaving the hoof locations smooth. Sand the base. Glue the horse to the base with strong synthetic or hot animal glue, *not* common liquid glue.

The finish: Sponge the wood with a damp cloth and allow it to dry. Sand it smooth with fine abrasive paper. Use wood filler as directed on the can. When the filler is thoroughly dry, clean wood with steel wool. Heat a small amount of raw linseed oil and apply it hot to the wood. Allow it to stand for one-half hour; then rub off all excess oil with a soft cloth. Repeat oil applications once a week for four or five weeks.

Other finishes such as shellac or lacquer may be used. They should be rubbed dull and waxed.

CONSERVING FINISHES AND PAINTS

HOMER C. ROSE
Teacher Trainer
Armored Force School
Fort Knox, Ky.

Cans half filled with scummy paint or other finishing materials are such a common sight in home and school shops that they are often taken for granted, just as if that were the natural end for a partly used finishing material.

The average procedure in using a can of finishing material is to pry off the lid, stir the contents, use a little, and then pound the cover back into its groove.

The paint in the groove makes a seal between cover and can, and the contents will remain in good condition. Apparently all is well.

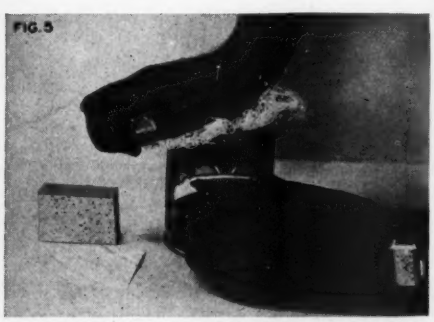
Fig. 1. A sight frequently seen
Fig. 2. Be careful how you wipe your brush

Fig. 3. Clean out the groove before replacing the cover
Fig. 4. Cleaning the cover

Paint for another job is needed. Again the cover is pried off. A little paint is used. This time, when the job is completed, the cover is obstinate, due to the accumulation of hardened paint on groove and cover. Stepping on can is sometimes recommended for such obstinacy. Perfect seal is impossible because of the dry paint left in the groove, thus scumming and hardening is inevitable.

To save finisher or paint, observe the following four simple rules.

One: When using a small amount of paint, keep the groove of the can clean. In other words, do not wipe the brush off on the top of the can. If you must wipe the brush off, use the underside of the groove. See Figure 2.



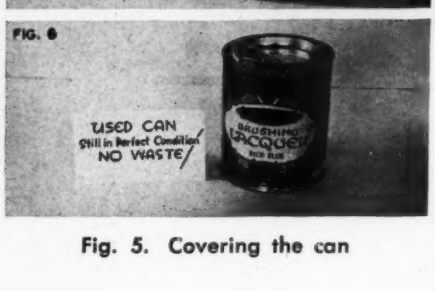


Fig. 5. Covering the can

Two: In larger jobs some paint will get into the groove. This does no harm if you wipe the top of the groove thoroughly with cotton waste or a wiping cloth before replacing the cover. See Figure 3.

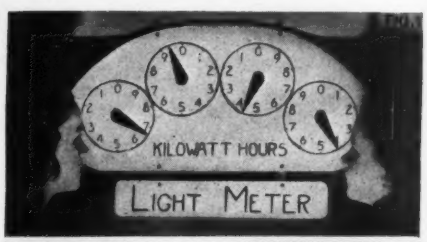
Three: Clean the cover. See Figure 4.

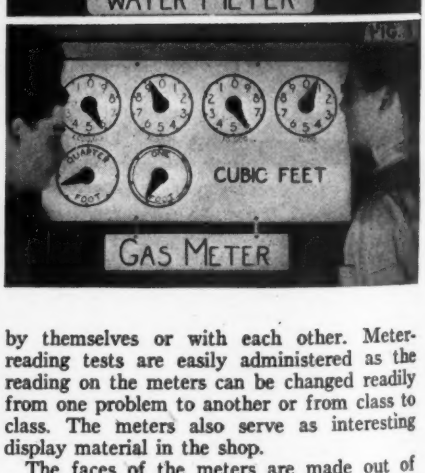
Four: Press cover into place and remove every trace of external paint. The paint in the can will then always be in condition. See Figures 5 and 6.

METER-READING AIDS

EINAR E. SIRO
Public Schools
Minneapolis, Minn.

The need for continually drawing and sketching of the different meters on the blackboard for teaching and testing purposes, prompted the making of the large meter faces with movable hands shown in Figures 1, 2, and 3. These teaching aids are excellent for teaching meter reading. Students can practice





by themselves or with each other. Meter-reading tests are easily administered as the reading on the meters can be changed readily from one problem to another or from class to class. The meters also serve as interesting display material in the shop.

The faces of the meters are made out of 3/8 in. fir plywood. Any other suitable material

also may be used. The water meter is 30 in. in diameter, and the individual dials 7 in. in diameter. The gas meter is 30 in. wide and 18 in. high, with 6 in. dials. The light meter is

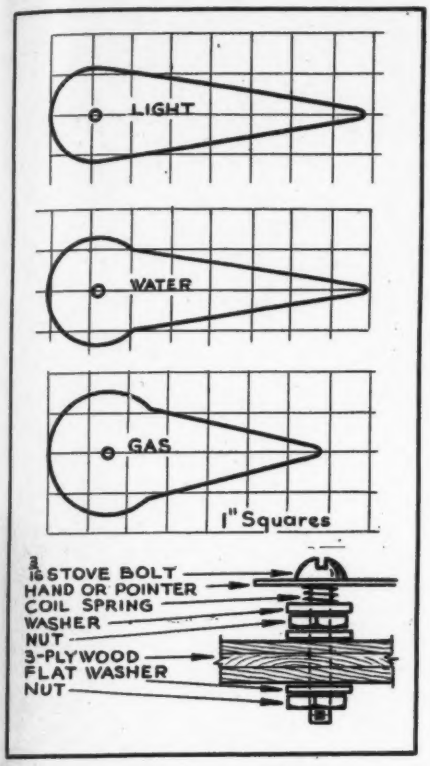


Fig. 4. Meter hand details and method of fastening

30 in. wide, 14 in. high, and the dials are 7 in. in diameter. Meter faces are finished with a coat of shellac to seal the grain of the wood and then with a coat of white enamel. The dials, numbers, and letters on the meters were painted in black enamel with a small artists' brush. The numbers on the dials can be printed in the school print shop on paper or cut out of a large calendar and then glued into place. The hands are made out of 20-gauge sheet metal and are finished with black enamel. Size and construction of the hands are given in Figure 4. The meter faces should be of the type used in the community.

CONSERVING WELDING ELECTRODES*

CLAYTON B. HERRICK

Cleveland, Ohio

The necessity of conserving materials in the war effort is nowhere more urgent than in the use of welding.

In order that welding may contribute its utmost potentiality in war production, it is important that welding materials be utilized to maximum advantage. This applies particularly to welding electrodes.

There are a considerable number of factors which affect the most efficient use of electrodes. If conscientiously controlled, these factors will contribute to the best use of welding in the war effort. The result will be a still faster rate of production by the use of welding and full utilization of the materials which welding equipment manufacturers are producing at peak capacity.

The factors which have an important bearing on this situation follow:

1. *Select the Right Type of Joint and Be Careful of Fit-Up.* There is a type of joint best suited to the particular job. See Figure 1.

Joints and their fit-up should be given most careful consideration, as fit-up affects not only the cost of the welded joint as such, but also the performance of the finished product. See Figure 2.

2. *Choose the Correct Type of Electrode.* While the general purpose electrode will pro-

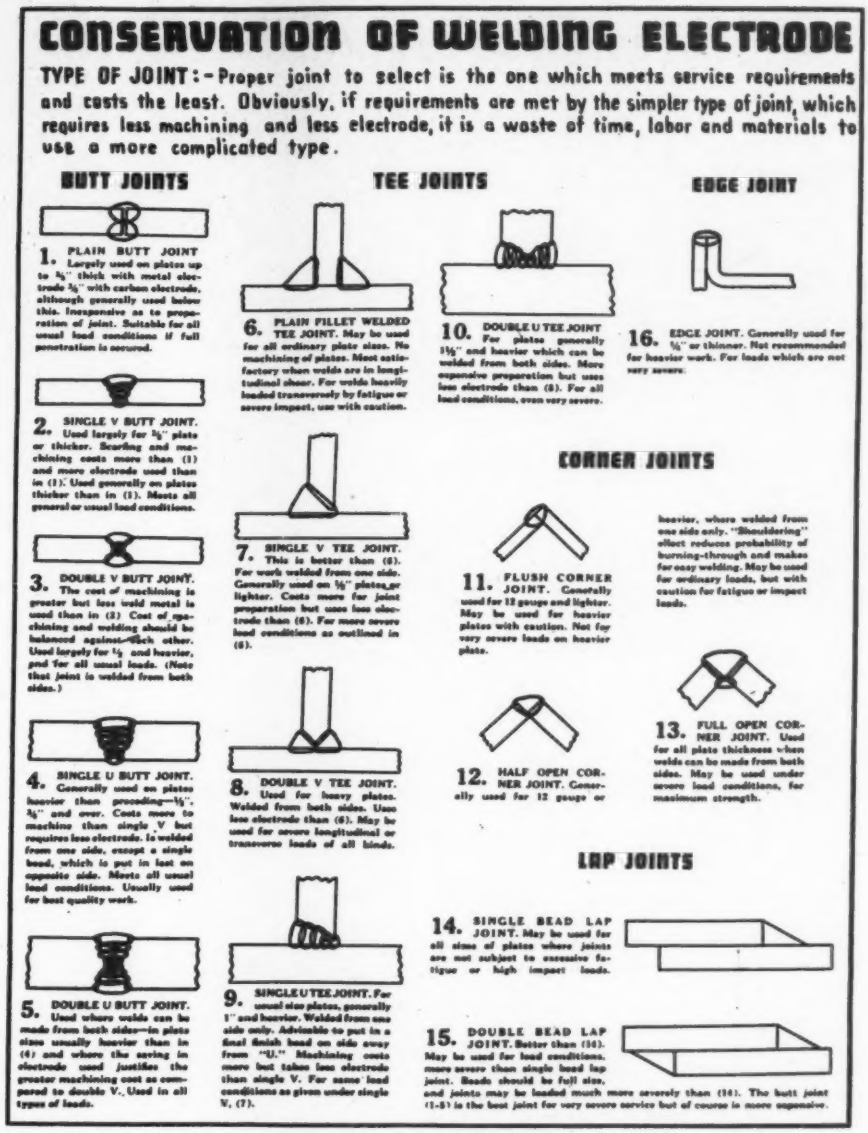

CONSERVATION OF WELDING ELECTRODE
TYPE OF JOINT:- Proper joint to select is the one which meets service requirements and costs the least. Obviously, if requirements are met by the simpler type of joint, which requires less machining and less electrode, it is a waste of time, labor and materials to use a more complicated type.
BUTT JOINTS
TEE JOINTS
EDGE JOINT
CORNER JOINTS
LAP JOINTS
1. PLAIN BUTT JOINT
2. SINGLE V BUTT JOINT.
3. DOUBLE V BUTT JOINT.
4. SINGLE U BUTT JOINT.
5. DOUBLE U BUTT JOINT.
6. PLAIN FILLET WELDED TEE JOINT.
7. SINGLE V TEE JOINT.
8. DOUBLE V TEE JOINT.
9. SINGLE U TEE JOINT.
10. DOUBLE U TEE JOINT
11. FLUSH CORNER JOINT.
12. HALF OPEN CORNER JOINT.
13. FULL OPEN CORNER JOINT.
14. SINGLE BEAD LAP JOINT.
15. DOUBLE BEAD LAP JOINT.
16. EDGE JOINT.

Fig. 1. Types of joints

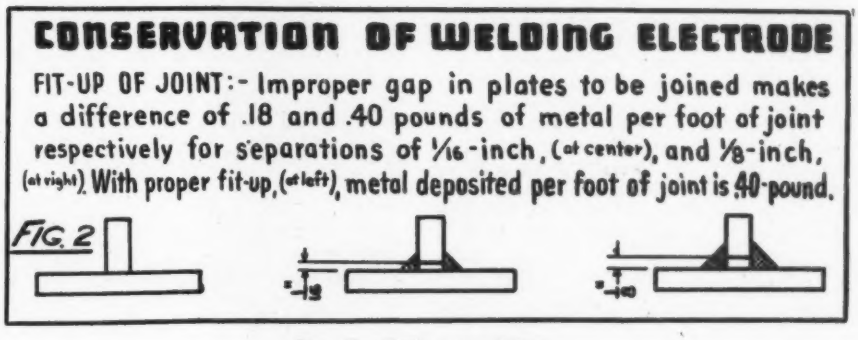

CONSERVATION OF WELDING ELECTRODE
FIT-UP OF JOINT:- Improper gap in plates to be joined makes a difference of .18 and .40 pounds of metal per foot of joint respectively for separations of 1/16-inch, (at center), and 1/8-inch, (at right). With proper fit-up, (at left), metal deposited per foot of joint is .40-pound.
FIG. 2

Fig. 2. Fitting up joints

*All illustrations courtesy of The Lincoln Electric Co., Cleveland, Ohio.

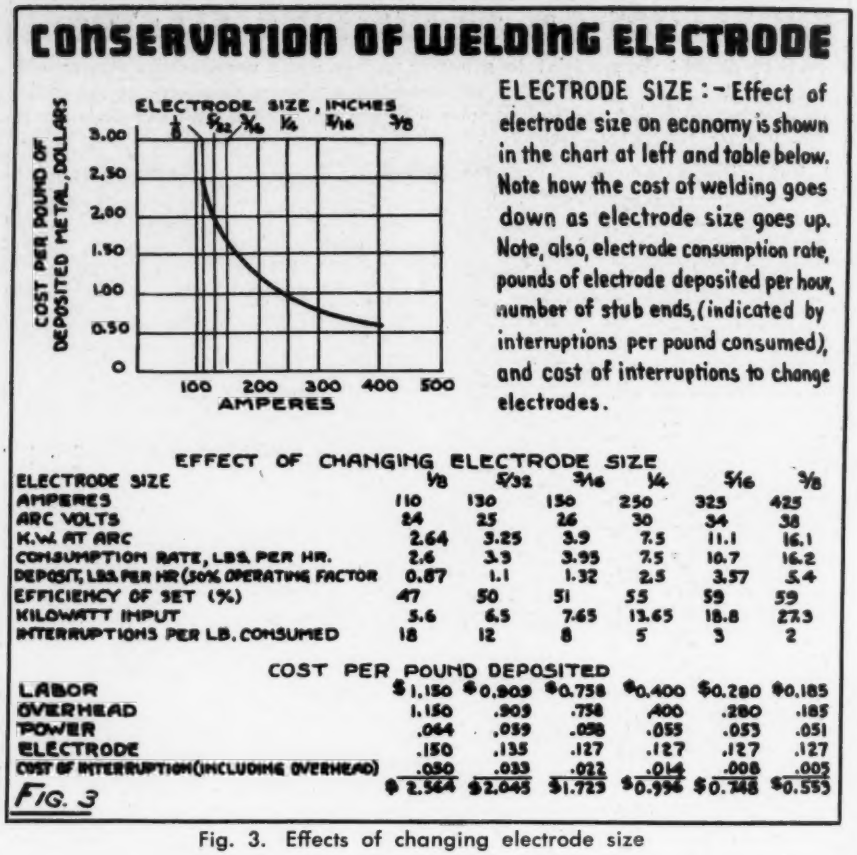

CONSERVATION OF WELDING ELECTRODE
ELECTRODE SIZE, INCHES
1/8 5/32 3/16 1/4 5/16 3/8
COST PER POUND OF DEPOSITED METAL, DOLLARS
3.00
2.50
2.00
1.50
1.00
0.50
0
100 200 300 400 500
AMPERES
ELECTRODE SIZE :- Effect of electrode size on economy is shown in the chart at left and table below. Note how the cost of welding goes down as electrode size goes up. Note, also, electrode consumption rate, pounds of electrode deposited per hour, number of stub ends, (indicated by interruptions per pound consumed), and cost of interruptions to change electrodes.
EFFECT OF CHANGING ELECTRODE SIZE
ELECTRODE SIZE 1/8 5/32 3/16 1/4 5/16 3/8
AMPERES 110 130 150 250 325 425
ARC VOLTS 24 25 26 30 34 38
K.W. AT ARC 2.64 3.25 3.9 7.5 11.1 16.1
CONSUMPTION RATE, LBS. PER HR. 2.6 3.3 3.95 7.5 10.7 16.2
DEPOSIT, LBS. PER HR (50% OPERATING FACTOR 0.87 1.1 1.32 2.5 3.57 5.4
EFFICIENCY OF SET (%) 47 50 51 55 59 59
KILOWATT INPUT 5.6 6.5 7.65 13.65 18.8 27.3
INTERRUPTIONS PER LB. CONSUMED 18 12 8 5 3 2
COST PER POUND DEPOSITED
LABOR $1.150 $0.909 $0.758 $0.400 $0.280 $0.185
OVERHEAD 1.150 .909 .758 .400 .280 .185
POWER .064 .039 .058 .055 .053 .051
ELECTRODE .150 .135 .127 .127 .127 .127
COST OF INTERRUPTION (INCLUDING OVERHEAD) .050 .033 .022 .014 .008 .005
$2.564 $2.045 $1.723 $0.996 $0.748 $0.553
FIG. 3

Fig. 3. Effects of changing electrode size

duce satisfactory welds under virtually every condition, special electrodes, as for example, heavily coated fast-flowing types would prove more efficient. The electrode should be chosen with respect to: (*a*) physical properties required; (*b*) type of joint; (*c*) position of welding, that is, flat, vertical, overhead, or horizontal; and (*d*) condition of fit-up of the work. Recommendations of the equipment manufacturer should be considered.

3. *Use an Electrode Which Has and Maintains a Uniform Coating.* The electrode coating, if not correct, will cause rejects not only of the electrodes themselves but possibly of the welds produced by their use. It should be remembered that the coating not only produces the protecting shield but it also controls: (1) fluidity of the metal; (2) penetration; (3) shape of the beads; (4) physical properties of the deposit; and (5) composition of the deposit.

4. *Use Electrodes Which Provide Proper Physical Properties.* Electrodes manufactured today are clearly described by the manufacturer in respect to the quality of weld they will produce. Required physical properties of the work at hand should be known and the electrode should be selected to meet these requirements.

5. *Use Fast-Flowing Electrodes Wherever Possible.* Certain electrodes are manufactured today to permit the fastest possible welding under specified conditions. It is obvious, therefore, that the electrode and, hence, time will be saved if these fast-flowing types are used wherever practical.

6. *Select an Electrode Which Keeps Splatter and Slag Loss at a Minimum.* Since all splatter is a waste of weld metal, the importance of this is obvious. It should be realized that the splatter loss of the electrodes vary and care should be taken to avoid use of those which have excessive losses.

7. *Wherever Possible Use Electrodes Which Produce Flat Beads.* It is a waste of welding electrode to deposit any more metal than is required. Not only is the welding electrode itself wasted but useless time is required to remove the excess metal from the welded joint.

8. *Select the Right Size Electrode.* The largest diameter electrode which can be used effectively is the best from the standpoint of electrode conservation. The saving runs up to 40 per cent per pound deposited, for example, when ¼-in. is used instead of 3/16-in. See Figure 3.

9. *Use Long Electrodes in the Larger Size.* The obvious result is the reduction in the number of stub ends and in the time saved by eliminating interruptions to change rods. The 18-in. length should be used in ¼-in. and larger sizes.

10. *Do Not Bend Electrodes.* This generally unnecessary habit will waste from ¼ to 1/3 of the electrode. Use electrodes straight and get the maximum of deposited weld metal from each rod.

11. *Use Proper Voltage and Current Settings.* Every electrode manufactured is designed to operate at a certain voltage and within a specified current range. If current is too high or too low, it will manifest itself either in excessive splatter loss or inferior welds, having improper fusion and penetration. See Figures 4, 5, and 6.

12. *Follow the Procedure Specified for the Electrode.* Accompanying each different electrode manufactured are detailed specifications

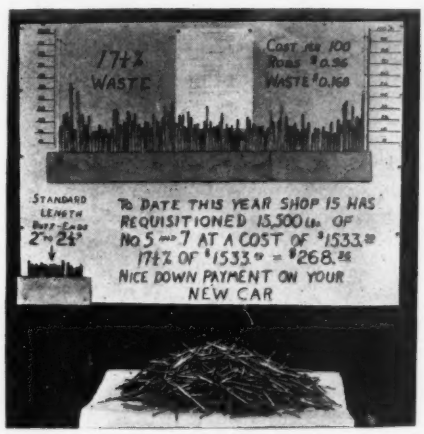

17½ WASTE
STANDARD LENGTH BUTT-ENDS 2" to 2½"
TO DATE THIS YEAR SHOP 15 HAS REQUISITIONED 15,500 Lbs. OF No 5 and 7 AT A COST OF $1533.
17½ OF $1533 = $268.
NICE DOWN PAYMENT ON YOUR NEW CAR

Fig. 7

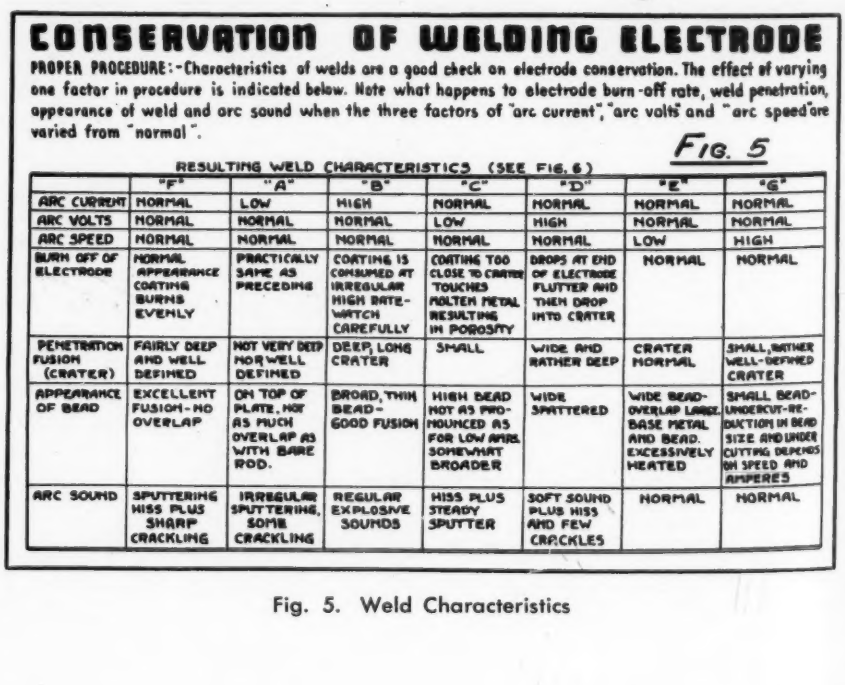
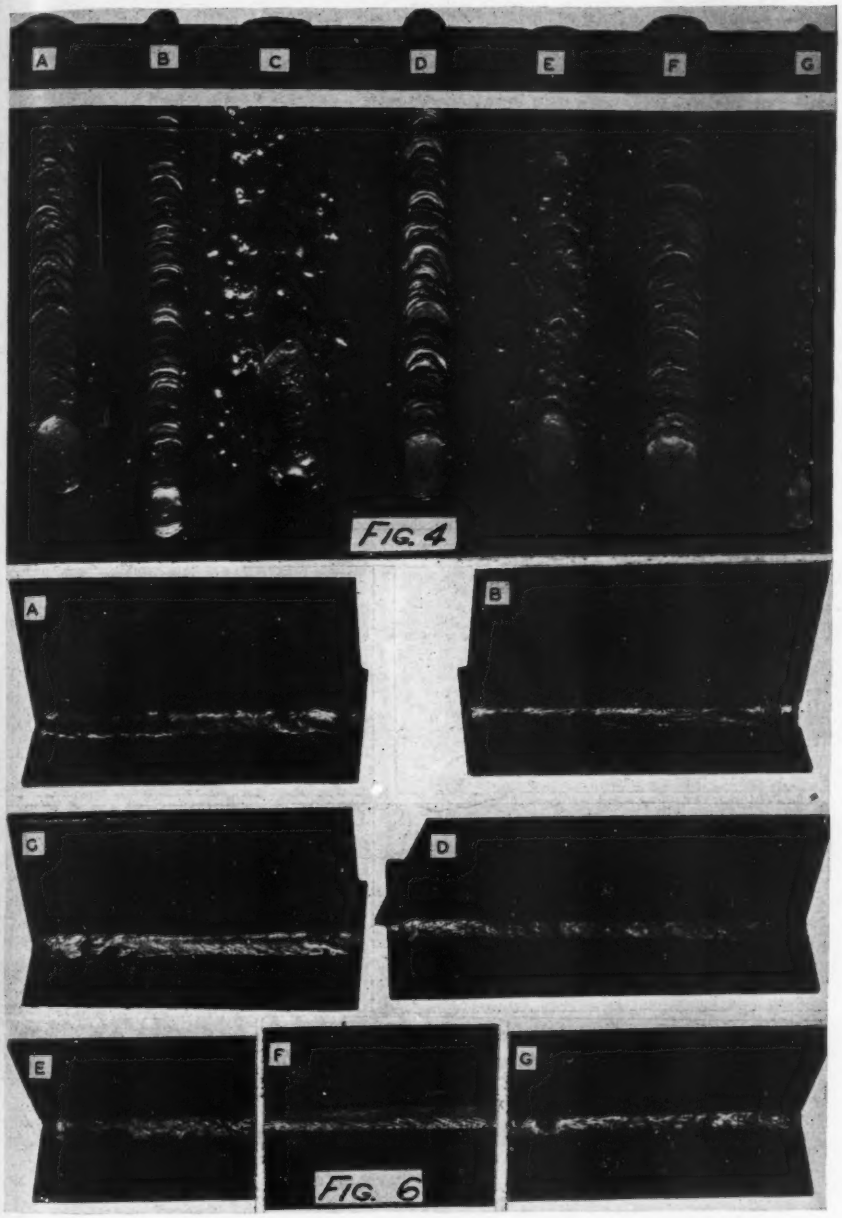

CONSERVATION OF WELDING ELECTRODE
PROPER PROCEDURE:- Characteristics of welds are a good check on electrode conservation. The effect of varying one factor in procedure is indicated below. Note what happens to electrode burn-off rate, weld penetration, appearance of weld and arc sound when the three factors of "arc current", "arc volts" and "arc speed" are varied from "normal".
FIG. 5
RESULTING WELD CHARACTERISTICS (SEE FIG. 6)
"F" "A" "B" "C" "D" "E" "G"
ARC CURRENT NORMAL LOW HIGH NORMAL NORMAL NORMAL NORMAL
ARC VOLTS NORMAL NORMAL NORMAL LOW HIGH NORMAL NORMAL
ARC SPEED NORMAL NORMAL NORMAL NORMAL LOW HIGH
BURN OFF OF ELECTRODE NORMAL APPEARANCE COATING BURNS EVENLY
PRACTICALLY SAME AS PRECEDING
COATING IS CONSUMED AT IRREGULAR HIGH RATE-WATCH CAREFULLY
COATING TOO CLOSE TO CRATER TOUCHES MOLTEN METAL RESULTING IN POROSITY
DROPS AT END OF ELECTRODE FLUTTER AND THEN DROP INTO CRATER
NORMAL
NORMAL
PENETRATION FUSION (CRATER) FAIRLY DEEP AND WELL DEFINED
NOT VERY DEEP NOR WELL DEFINED
DEEP, LONG CRATER
SMALL
WIDE AND RATHER DEEP
CRATER NORMAL
SMALL, RATHER WELL-DEFINED CRATER
APPEARANCE OF BEAD EXCELLENT FUSION-NO OVERLAP
ON TOP OF PLATE, NOT AS MUCH OVERLAP AS WITH BARE ROD.
BROAD, THIN BEAD-GOOD FUSION
HIGH BEAD NOT AS PRONOUNCED AS FOR LOW AMPS. SOMEWHAT BROADER
WIDE SPATTERED
WIDE BEAD-OVERLAP LARGE. BASE METAL AND BEAD EXCESSIVELY HEATED
SMALL BEAD-UNDERCUT-REDUCTION IN BEAD SIZE AND UNDER CUTTING DEPENDS ON SPEED AND AMPERES
ARC SOUND SPUTTERING HISS PLUS SHARP CRACKLING
IRREGULAR SPUTTERING, SOME CRACKLING
REGULAR EXPLOSIVE SOUNDS
HISS PLUS STEADY SPUTTER
SOFT SOUND PLUS HISS AND FEW CRACKLES
NORMAL
NORMAL

Fig. 5. Weld Characteristics



Figs. 4 and 6. Effect of voltage on welds

regarding procedures to be followed. These specifications have been prepared carefully by the electrode manufacturer and, if followed consistently, will prevent waste of electrode and assure high quality welding.

13. *Avoid Using an Excessive Number of Beads.* If one bead of weld metal will meet design requirements, it is obviously a waste of electrode to add additional beads. This same applies to applications where two beads suffice. Additional beads are simply a useless waste of electrode.

14. *Use Electrode Down to Minimum Stub End.* Remember that the electrode can be used the entire length of its coated surface. Leaving any more than a minimum stub end is an obvious waste. By using care in gripping the electrode at its extreme end in the holder and burning it down to the maximum extent, the operator is rendering a patriotic service in saving electrode. Just ½-in. difference in stub end saves 3½ per cent on an 18-in. length rod. The accompanying illustration (Figure 7) shows the great variation in stub ends in one welding shop. As indicated, this waste amounted to 17½ per cent. In cost, for the time covered, it amounted to $268.36.

15. *Collect and Save Stub Ends of Electrodes.* At the rate in which welding is being used today in war production, the amount of metal which would be wasted by failure to save stub ends would be tremendous. The average stub end is 2 in. long and this length multiplied by the millions of electrodes used, would constitute the great loss.

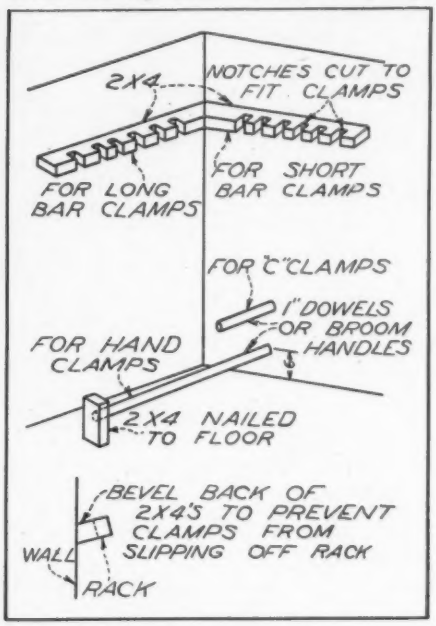
16. *Use Modern High Capacity Welding Generator.* Welding generators manufactured today have much higher capacity and much greater efficiency. For example, a modern 40-volt generator was shown to produce 7.7 in. of joint per electrode as against 6.6 in. for an older machine.

CORNER CLAMP RACK

CECIL FORD

Supervising Principal
Public Schools
Delmar, Del.

The clamp rack shown presents a good way of using that cluttered up corner in the school or home workshop. These racks keep the clamps within easy reach as well as in order. The top racks are located up high



Corner clamp rack

enough to keep the bottom of the clamps off the floor. The dowel or broom handle for the hand clamps is located about 6 in. above the floor. The dimensions for the racks depend, of course, on the number of clamps that are to be accommodated.

GRAPHIC-ARTS PROGRESS

R. RANDOLPH KARCH

Printing High School
Cincinnati, Ohio

At the present writing, the status of vocational printing education with regard to numbers of students is a moot point. Some believe that a turning point will be reached when the public wakes up to the fact that little Willie may learn a trade in school during the next three or four years which will graduate him into the ranks of the great unemployed when the war ends. On the other

(Continued on page 18A)

AN ADAPTABLE SHELF DESIGN

DELMAR W. OLSON

Southern Illinois Normal University
Carbondale, Ill.

FRED EBERLE

West Virginia Institute of Technology
Montgomery, W. Va.

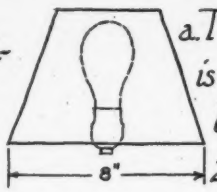
From the original design of a corner shelf, shown in Figure 1, the six other shelves shown

(Continued on page 364)

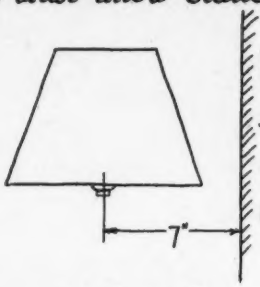
HOW DOES THE DESIGNER THINK OUT A PLAN?

1. He must understand a need. For example: a movable wall lamp is needed. The designer first sees the problem as a whole, without knowing many of its details. These require further study.

2. He must know standard fixed requirements.



a. The light source chosen is a 60 w. Mazda bulb, 4½" high and 2½" in diameter.

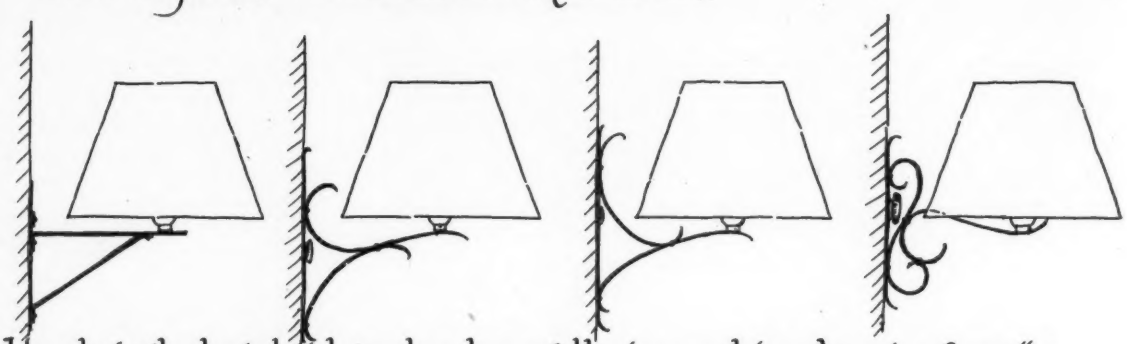


b. The bulb and 8" parchment shade are to be held at a certain distance from the wall.

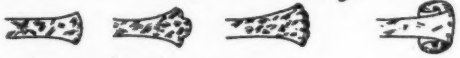
c. Once these fixed elements are decided, the problem remains of planning a bracket to hold them in place.

3. He must select the most suitable materials. In this case the bracket may be made of any band form of metal: iron, copper, brass, aluminum, pewter, etc. Other furnishings in the room, cost, strength, durability, and construction methods to be used, each and all influence the selection.

4. He must decide the details of form, line, proportion, and construction. To aid in trying out ideas, the designer makes many "thumb-nail" sketches, always starting with the fixed, or conventional requirements.



5. He selects the best sketch and makes a full-size working drawing from it.
6. He refines proportions and details.



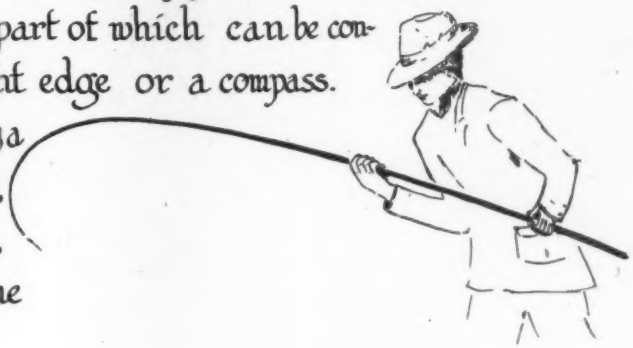
7. He has the drawing checked by some competent person.
8. He makes revisions where these are necessary.
9. He examines the article made from his drawings to learn how well his idea has worked in practice, and how he may improve on the next design.

Analysis ~ decision ~ trial ~ action ~ judgment ~ improvement

Plate 4. Continuation of design course by Burl N. Osburn, Director of Industrial Arts, State Teachers College, Millersville, Pa.

WHAT IS A GOOD CURVED LINE?

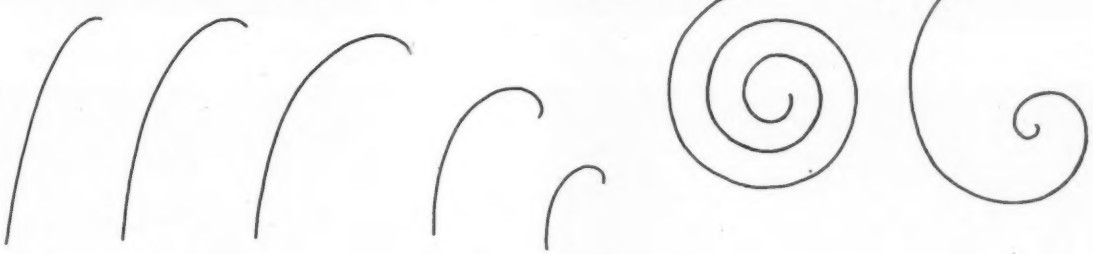
The line used in fine design for many ages is one sometimes known as the curve of force. It is a freehand line, no part of which can be constructed with a straight edge or a compass. Such a line is formed by a long wet blade of grass, a young willow branch, or a strong pull on a fine fishing rod.



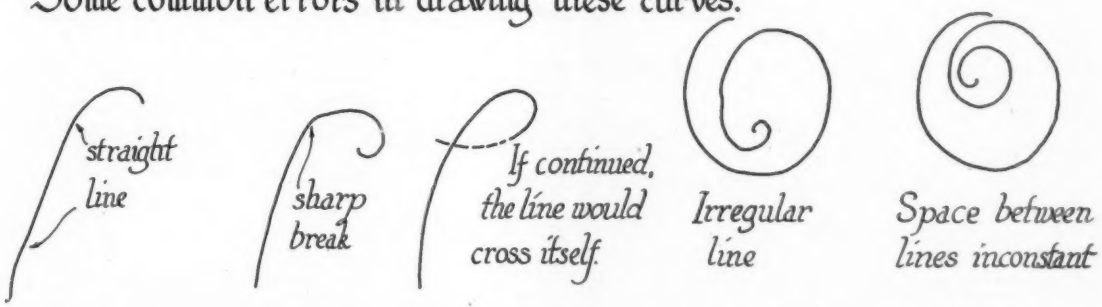
When it is continued far enough the curve of force becomes a volute.

The volute also occurs universally in nature. Its use in design has been long and widespread.

These curves have an infinite variety in the rate of curvature ranging from very slow to very fast.



Some common errors in drawing these curves:



The beginning designer will do well to practice until he has mastered drawing these curves. It helps to start practice on the blackboard, or a large sheet of paper, using a full-length arm motion.

Plate 5. Design course by Burl N. Osburn, Director of Industrial Arts, State Teachers College, Millersville, Pa.

ADAPTABLE SHELF DESIGN

(Continued from page 361)

in Figures 2, 3, 4, and 5, were developed. All of them have similar lines and curves, but they have been used in varying combinations to make an interesting series of designs. All of these designs are related, yet all are different. This shows the possibilities that a single design may have, whether it be a corner shelf or a dining-room table.

The homecraftsman often has difficulty in designing his own projects. It is helpful in learning to design to take a given project and to change it, or at least try to change it. The results may not be as satisfactory as desired, yet comparing the two designs and picking out good points as well as weaknesses, gives one a wealth of design experience.

The shelves in this series were made of ⅜- and ½-in poplar, although other wood may be used. The squares in the illustrations are 1 in. They, too, may be changed.

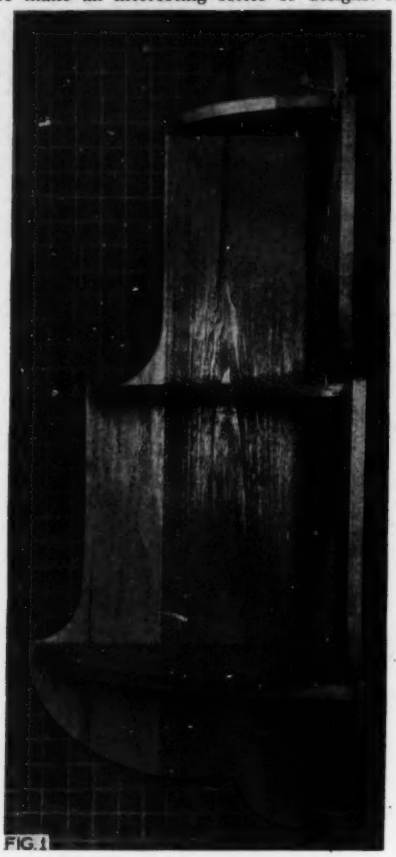


FIG. 1

The original corner shelf

FIG. 2

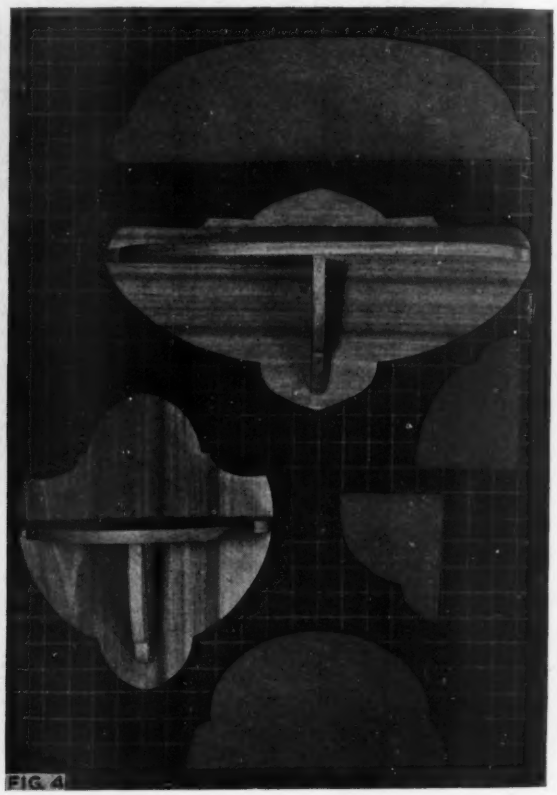


FIG. 4

A simpler design in a corner shelf, and two wall shelves

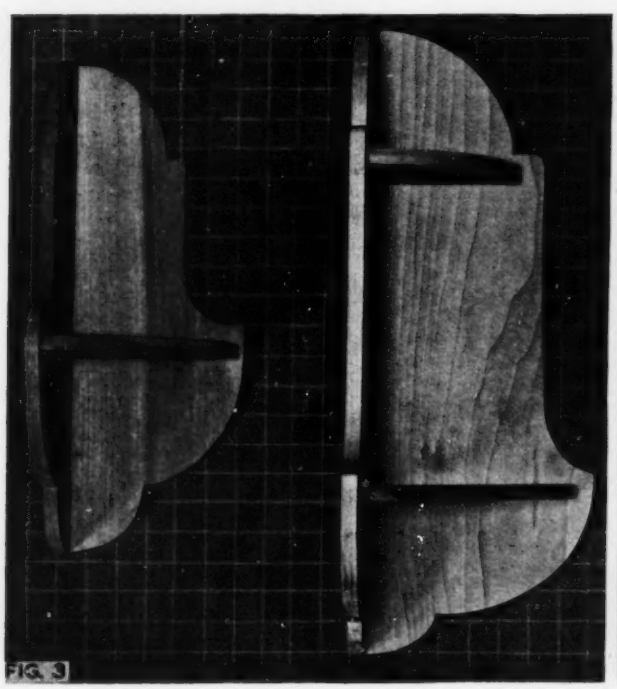


FIG. 3

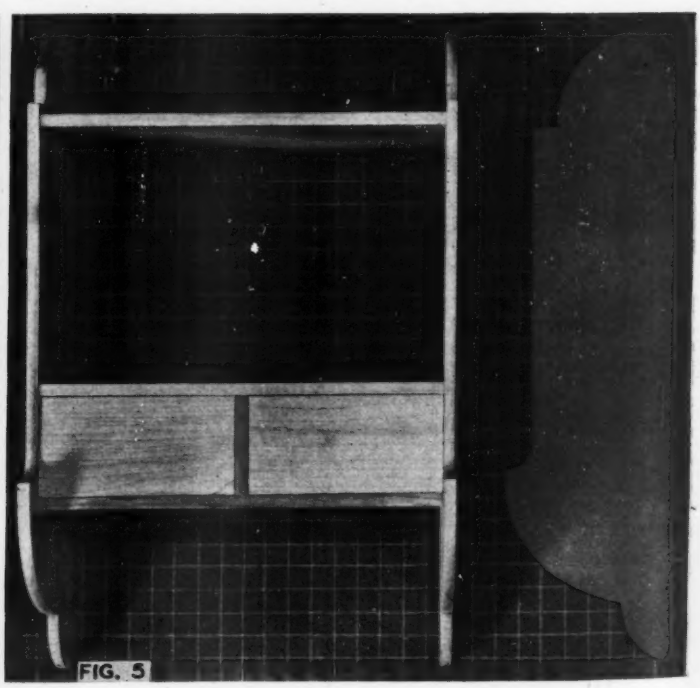


FIG. 5

Two smaller editions of the corner shelf, and a wall shelf for books. Note the possibilities for drawers

ATTENTION MANUAL TRAINING INSTRUCTORS!

Your students can get this valuable Tool Manual *FREE* at local hardware stores

48 Pages
200 Illustrations

Every one of your young craftsmen can benefit by the use of the informative Disston Saw, Tool and File Manual. Advise them to get this valuable book from the hardware dealer in their community, *without cost or obligation.*

The Disston Saw, Tool and File Manual is a practical book on tool use, carefully prepared by experts. It is written in plain, to-the-point terms—profusely illustrated with simple diagrams and helpful pictures—contains hundreds of helps and hints.

Here is a real Tool Manual that not only proves its worth in workshop practice . . . but also provides inspiration and incentive that will speed training and help develop better craftsmen. Moreover, it will simplify your work of supervision and instruction.

In addition to the Disston Saw, Tool and File Manual, Disston also supplies, *without charge,* educational charts and other material for classroom and workshop use. Urge your students to get the Disston Manual from their hardware dealers. Write us about the other free material *today!*

CONSERVATION SERVES EVERYONE

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

HENRY DISSTON & SONS, INC.
1038 Tacony, Philadelphia, Pa., U. S. A.

WAR INDUSTRIES USE THIS METAL CUTTING METHOD

Use Peerless Metal Cutting Power Saws For Training . .

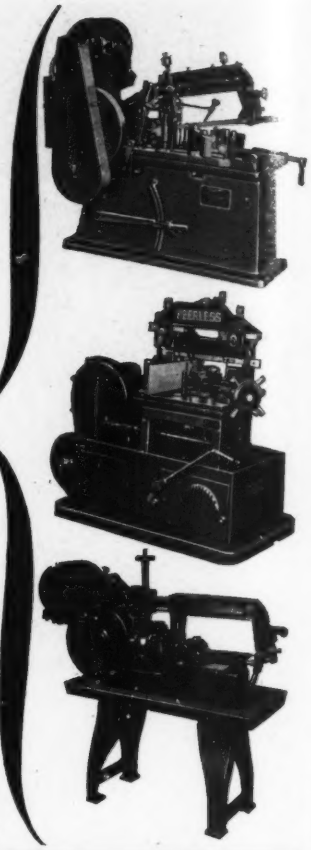
Industrial arts directors recognize the need for training potential war workers along practical lines — with the tools war industries use for high speed, accurate cutting.

Peerless Saws, because of their faster action, safety features, accurate cutting and operating economy — have replaced wasteful, more costly methods on wartime's faster-moving production lines.

Such features as Peerless hydraulic control, including length gauging on the automatic types, and the patented Four-Sided Saw-Frame and Backing-Plate Blade-Support have set a new standard for power sawing.

There are four bulletins covering the broad Peerless Line — Bulletin 50-A on High Duty Hydraulic types . . . Bulletin 53 on Heavy Duty Hydraulic Saws for die-block work . . . Bulletin 51-A for Universal types with mechanical control . . . and Bulletin 52 covers Standard Models for general utility cutting.

All bulletins sent free on request to Dept. J. .



PEERLESS MACHINE COMPANY, RACINE, WIS.

DETAILED SPECIFICATIONS

	*HIGH DUTY (Hydraulic)		UNIVERSAL			STANDARD (3) Sp. Mtr. Dr.			DRY-CUT SINGLE SPEED
SIZES	PLAIN 6½" x 6½"	PLAIN 10" x 10"	6⅜" x 6⅜"	10" x 10"	13" x 13"	6" x 6"	9" x 9"	13" x 16"	4½"
Cap. @ 45° Angle	4" x 6"	6" x 10"		6" x 10"	9" x 13"	4" x 6"	5¾"	10"	
Speeds (3) Strokes Per Min.	60-100 140	50-85 125	50-85 125	50-85 125	50-85 125	50-85 125	50-85 125	50-85 125	75-100
Floor Space	30" x 54"	36" x 57"	24" x 43"	30" x 68"	38" x 75"	21" x 54"	26" x 86"	28" x 102"	16" x 30"
Shipping Weight with Motor	2170 lb.	2930 lb.	1000 lb.	2175 lb.	3200 lb.	1125 lb.	1460 lb.	2110 lb.	250 lb.

*High Duty (hydraulic) Saws also available with automatic Bar Feed.

GRAPHIC ARTS PROGRESS

(Continued from page 361)

hand, some see that the public is still in high pitch for grasping alleged high wages offered in certain vocational areas. September enrollments will bear out the winner of the discussion.

It is ridiculous to say that the graphic arts are not an *essential* industry. Without paper — and printed and lithographed paper — the war could not be fought, or won. At the present time the training of apprentices for the printing trades has not been able to keep up with the demand. This is in spite of the fact that the volume of printing business is slightly lowered.

Young men now entering the vocational printing schools will undoubtedly be in the driver's seat at the war's end, and will gain a coveted labor market. Resumption of advertising and kindred products may be a boom little dreamed of now.

A few items of seeming pertinent interest are discussed in this article:

Conversion — Little encouragement is held for those who would convert printing machinery to war production other than the usual printing as such. One would think that typecasting machines could cast bullets or some other gimmick now made from harder metals by other processes, probably by machining. It is generally thought that printing machinery can do little other than printing. Printing plants have a low potential for complete conversion. Printers have been told to go into the metalworking business, but they have not been told how they can do it, and no success is guaranteed as to the volume of business available. In view of the fact that machine shops in certain cities were actually advertising for war work in June, 1942, it seems problematical if many printers would find success awaiting them in the machine tool trade. Paper mills and printing manufacturers have turned over their machine shops to war production. However, the average printer has no lathes, shapers, and drills.

Paper Shortage — The bad guess of "experts" and the misguided drives for scrap paper have made a considerable dent in printing production. The dreaded paper shortage did not materialize; it caused some hoarding of paper — but still worse, conditioned the minds of some that they should curtail printing as a patriotic gesture, to save paper for the armed forces. This condition is being met by counteradvertising on the part of printer groups, who find their markets dwindling for absolutely no patriotic reason at the present time. Printers are out to get their markets back again, and will probably do so. Material shortages are no problem, but volume certainly is. The $10,000,000 in printed matter given to the printers by the Government Printing Office is a mere drop in the bucket, and probably only 1500 printers can get the work anyway.

The Graphic Arts in the War — Information concerning the work done by graphic-arts industry for winning the war is of interest to the teaching profession. An outline of the part played by a few of the processes follows:

Photoengraving — Photographic templates are widening bottlenecks in the production of bombers, eliminating an estimated 250 hours of checking time in the production of a set of templates for one drawing alone. Accuracy is held to tolerances of 1/1000 in. per foot. Many items are etched for ordnance on metal plates used on weapons and other military equipment. This etching is being done by engravers on aluminum, molybdenum, monel, celluloid, copper, glass, lead, magnesium, brass, bronze, nickel, plastic, silver, stainless steel, steel, and zinc.

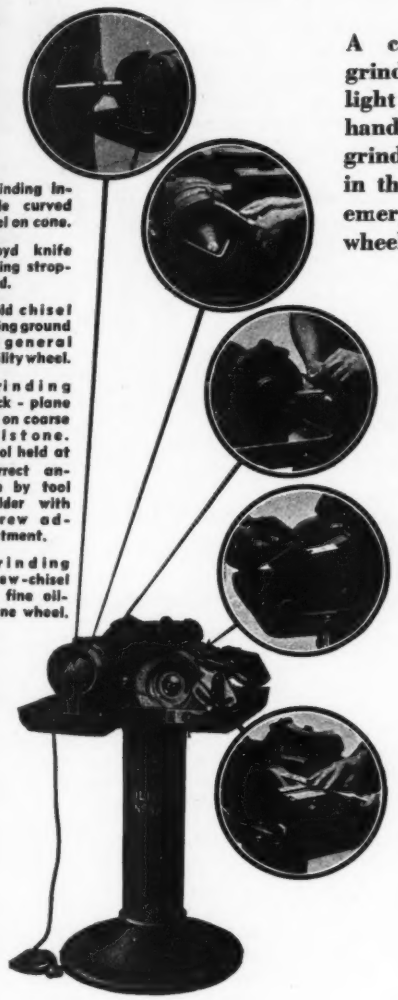
Bindery — Most of the war work has been in binding the millions of war manuals, brochures, and pattern targets for the various armed forces. In addition, we find that cellophane bags for chocolate bars are also in production, as well as water- and bug-proof paper boxes for vitamin bags. Other work consists of punching sheets for loose-leaf books for the keeping of records, binding blueprints in book form, the rebinding of blank and technical books for aircraft firms; maps, and blood-test sheets.

Silk Screen is used for replacing the hand-lettering of insignia on all kinds of armed-force goods, as on belts, hat bands, field equipment, shipping cases, arm bands, trucks, and airplane lettering. Also we find this process used in manufacturing propaganda posters, signs, car cards, and targets.

Lithography — The bulk of this work is used in making millions of copies of educational booklets used by the army, navy, and marine schools, as well as in war training of civilians. No data can be collected as to the number of mobile mapmaking units in the engineer corps, but the number is not inconsiderable. It is interesting to view the size of the runs made thus far:

15,000,000 posters for morale building
25,000,000 war stamp books
22,500,000 stamp posters
35,000 flag posters in 7 colors, 105 by 234 in.

IMPORTANT ADVANTAGES GAINED WITH "OLIVER" Oilstone Tool Grinder



1. Grinding inside curved tool on cone.
2. Sloyd knife being stropped.
3. Cold chisel being ground on general utility wheel.
4. Grinding jack - plane bit on coarse oilstone. Tool held at correct angle by tool holder with screw adjustment.
5. Grinding skew-chisel on fine oilstone wheel.

A compact, portable, variety grinder which operates from the light socket and which efficiently handles practically every tool grinding operation encountered in the school shop. Employs an emery cone, leather stropping wheel, coarse oilstone, fine oilstone and general utility grinding wheel.

Correctly sharpened tools mean more efficient teaching and the "Oliver" Oilstone Grinder provides the most economical and efficient means of putting a keen edge on chisels, gouges, plane bits, knives and other cutting tools.

You can go a long way to help your students do work of merit by providing them with an "Oliver" Oilstone Tool Grinder to keep their tools in the finest condition.

"Oliver" Tool Grinders, like all "Oliver" machines, are built to give lasting service.

Investigate these Tool Grinders, and compare them for yourself. Write for illustrated circular today.

The complete line of "Oliver" machines adapted to your needs includes: Planers, Saw Benches, Hollow Chisel Mortisers, Sanders, Band Saws, Grinders, Surfacers, Boring Machines, Jig Saws, Wood Trimmers, Vises, etc.

SPECIFY OLIVER

Wood Trimmer. A precision Tool for Squaring ends and Trimming angles.

Type "S" Glue Pot. Copper construction. Full line offered.

Woodworking Vise.

Write for descriptive bulletins and ask for information on the "Oliver" machines that may be of interest.

OLIVER MACHINERY COMPANY
Grand Rapids, Michigan, U. S. A.

STANLEY CHISELS and PUNCHES

No. 28 Cape Chisel

No. 48 Diamond Point Chisel

STANLEY TRADE MARK

No. 88 Center Punch

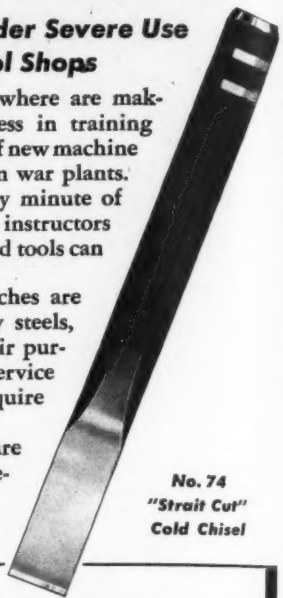
No. 98 Prick Punch

Stand Up Under Severe Use in School Shops

Instructors everywhere are making excellent progress in training the tens of thousands of new machine shop workers needed in war plants. With demands on every minute of their time, experienced instructors know how much help good tools can give them.

Stanley Chisels and Punches are forged from the finest alloy steels, and exactly tempered for their purpose. They can take the hard service beginners give them, and require less frequent sharpenings.

Styles and sizes for every need are listed in Catalog No. 34, which describes the complete line of Stanley Tools for school use. Write today.



No. 74 "Strait Cut" Cold Chisel

STANLEY TOOLS DIVISION OF THE STANLEY WORKS
EDUCATIONAL DEPT., NEW BRITAIN, CONN.

(Continued from page 18A)

4,000,000 flag posters in 7 colors in smaller size.

Soldier Newspaper — The *Yank*, the soldier's newspaper, sans ads, will probably be reproduced in millions. The first edition run totaled 200,000. In line with the probable best reproduction method, it may be printed gravure, letterpress by stereotypes, or offset in shops adjacent to large concentrations of troops.

Army and Navy Printers exist in considerable numbers, according to reports from various sources. The number of plants is unknown — a military secret — but estimated from 100 to 300. Some civilians are employed in most armed-force shops. A new ruling gives printers a technician's rating. The engineers are said to have the best equipped and largest plants. Photos, maps, orders, circulars, and forms are reproduced in the millions, and both letterpress and offset processes are used.

Type-casting equipment is extensively used by the army and the navy. Thirty-two machines of one-line-slug variety alone are used by the navy. Others are used at the United States Military Academy, General Staff School in Kansas, Air Corps School in Ohio, Field Artillery School of Fire in Oklahoma, a Georgia Cavalry School, an Engineer School in Virginia, Quartermaster's Depot in Indiana, Recruiting Station in New York, Army Hospital in California, and Veteran Hospital in Massachusetts.

"Fighting" Printers — Printers caught in the draft are said to be regarded as good material for re-educating in war work such as fuse loading on gun-firing mechanism, and other work with fine tools and machinery.

Personal News

DR. LUDINGTON APPOINTED STATE SUPERVISOR

Dr. John R. Ludington, associate professor of industrial-arts education, of the North Carolina State College of the University of North Carolina, has been appointed state supervisor of industrial arts for North Carolina. The appointment was made by Dr. Clyde Erwin, state superintendent of public instruction with the approval of Colonel J. W. Harrelson, dean of administration at State College.

Dr. John R. Ludington

Although Dr. Ludington will continue as a member of the state College faculty, he will head the department of industrial arts with the same status as supervisors of other phases of the public school program. This appointment was made as a further step in enriching the school program in North Carolina and is in harmony with the proposals of the committee developing suggestions for the new 12-year program.

Dr. Ludington received the B.S. degree from the Ball State Teachers College and the M.A. and Ph.D. degrees from Ohio State University. He has taught in the public schools of Muncie, Ind., Ball State Teachers College, Ohio State University, and the graduate school of Northwestern University. He serves on the editorial board of *The Teachers Digest*, is a consultant in education for Pfeiffer Junior College, and has been a member of the U. S. Office of Education Committee on Industrial Arts. He also holds memberships in several professional and honorary organizations in the field of education.

PROFESSOR W. C. WILSON DIES

Professor Walter C. Wilson, for 31 years head of the Department of Industrial Arts at the State Teachers College in Johnson City, Tenn., died suddenly on June 30, 1942, as the result of a heart attack.

He was 79 years of age and had just recently retired from active teaching. Surviving are his widow, Sophronia Dyer Wilson, two children by a former marriage, Clyde H. Wilson and Mrs. John L. Wade, and 11 grandchildren. His son, Clyde, is head of the department of industrial education at the University of Tennessee and received his basic training under his father's direction while on the staff of Miami University, Oxford, Ohio.

Professor Wilson was a pioneer in industrial-arts teacher training in Tennessee, having inaugurated the first department in a state institution for training industrial-arts teachers in 1911. Alumni from his department are now scattered throughout this section of the South.

In addition to his work as an educator, he was active in civic affairs, having served as president of the Kiwanis Club, Lieutenant-Governor

(Continued on page 23A)

(Continued from page 20A)

for the Tennessee-Kentucky District of Kiwanis, and District Chairman of Vocational Guidance. He was a member of a number of national and state educational organizations in which he had served in various capacities through a long and useful life of service. He will be greatly missed in the annual gatherings of these organizations, but his influence and ideals will carry on.

♦ E. F. DANIELS, for the past six years state supervisor of trade and industrial education in Missouri, has recently been appointed training specialist at the Wellston Air Depot, Robbins Field, Macon, Ga.

During Daniel's stay in the State Department the program of trade and industrial education has doubled. The distributive occupations program alone has grown from 12 to 42 centers.

For the past four summers, Daniels has been a member of the faculty at the Trade and Industrial School of the University of Florida, Daytona Beach. He is a member of the Iota Lambda Sigma Chapter there.

The day before his departure from Missouri 26 teachers, co-ordinators, and directors of vocational education drove from every section of Missouri to the capital city and gave Mr. Daniels a going-away luncheon. He was presented with a gift, and letters were read from men in the field who were unable to attend.

♦ GEORGE L. SIMNICHT, formerly a teacher at Folwell School, Minneapolis, Minn., has accepted a position as instructor in the U. S. Navy Air Corps at Chicago.

♦ CLIFFORD C. CARLSON has been appointed supervisor of industrial arts at West Allis, Wis.

♦ CLYDE E. THOMAS, formerly connected with the Lincoln, Iowa, schools, and superintendent in several schools over the state, has been elected superintendent of schools in Sidney, Iowa. He will assume his new duties immediately. He is a former Nebraska University athlete.

♦ MR. M. A. MASSEY, superintendent of schools at Queensville, Ind., has been elected county superintendent of Gibson County (Indiana) with office at Princeton, Ind.

Association News

♦ The New England Industrial-Arts Teachers Association will hold its annual meeting at Worcester, Mass., November 6 and 7, 1942.

Romeo N. Collin, president; Otto Salak, vice-president; Willis B. Anthony, secretary; and Peter Marsaw, convention chairman are working hard to set up a program which will be interesting, helpful, and up to the minute.

The Bancroft Hotel will be headquarters. There will be sectional meetings held to cover the following topics: model airplanes, supervisors and superintendents, automotives — safety education, drafting, pictures, woodworking, and electricity.

The commercial exhibits also will be housed at the Bancroft Hotel.

♦ At the annual meeting of the board of directors of the National Association for Printing Education held on Monday, August 10, at the Pantlind Hotel, Grand Rapids, Mich., announcement was made of the completion of incorporation of the organization under Texas statutes.

Committee appointments made by President Fred W. Miller for the coming school year were confirmed by the board. Acting board chairman, Floyd C. Larson, was renamed by the board to serve as executive secretary and director of publications for the association through 1943.

R. Randolph Karch will head the educator's research commission this year and will conduct a research department in the *National Printing Education Journal,* the group's official monthly publication.

Financial reports for the past year were accepted and increased allotments of funds for the work of the student honor division were made. Mail ballot results of the membership poll regarding an increase in dues were announced and the board endorsed an increase in annual dues to $1.50 per member providing also for a sponsor membership with dues at $10.

The final draft of the constitution and by-laws was adopted and will be voted upon by the entire membership by mail ballot in September. Upon the ratification of the constitution, several new activities are to begin which will provide the membership with employment service as well as a bureau for the solution of professional problems and a nationwide promotional program of printing education and apprentice training.

Several prominent craftsmen were asked to attend board sessions which were held on several days during the convention of the International Association of Printing House Craftsmen, Inc., and because most members of the N.A.P.E. Board are craftsmen, it was decided to hold the 1943 sessions of the board of Memphis, Tenn., at the time of the craftmen's convention there next August.

♦ August 3, 1942, was a great day for the membership of Alpha Chapter of the Iota Lambda Sigma Fraternity, the National Honorary Fraternity in Industrial Education. The annual banquet and initiation was held at 6 p.m., in the State College Hotel, State College, Pa. Eleven neophytes were initiated. The meeting was in charge of Alfred Anderson of Connecticut, vice-president of Alpha Chapter. The toastmaster was Lester L. Fehr, a past president of Alpha Chapter, and now state supervisor of industrial education.

The membership of Alpha Chapter is made up of men who have attended the summer sessions at State College over a period of years. Recently a campus group was formed and they hold

(Continued on following page)

Filing Hints to meet war-time needs

HELLER NUCUT

How to take care of files

(PART II)

LAST MONTH a number of practical tips were given for helping the shop-worker take good care of his files. The following will also prove useful:

The oil with which new files are lightly coated should be removed before using the file on cast iron. This will make the teeth cut more easily.

Clean oil from file teeth with gasoline.

Keep files dry and free from rust.

When there is no oil on file, rubbing chalk in file teeth helps when making fine, smooth cuts.

When possible, hold the file horizontally.

Files should be kept clean during use both by frequently tapping the end on the bench to shake the filings or chips from the teeth, and by periodic cleaning with a file brush.

Files should never be placed in a drawer or among other tools; but should be kept separate either by hanging in a rack or placing in a slot in a file box. Don't let your files rub against one another. This will "kill" the cutting edges.

Use "single" cut files for draw filing. Hold the file at right angles to, and move it sidewise over, the work.

"MORE CUTS WITH NUCUTS" provided by this exclusive "Wavy Teeth" design

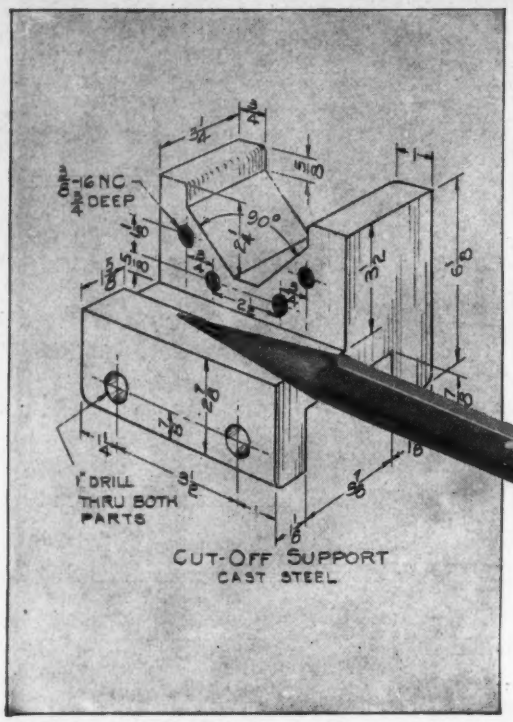
Possessing both coarse teeth and fine teeth, placed in patented wavy rows, a NUCUT File cuts deep, clean, true — and levels the surface off smooth at the same stroke! For this reason you'll find NUCUT filing faster, as well as better.

HELLER BROTHERS COMPANY • Newark, N. J. • Newcomerstown, Ohio
America's Oldest File Manufacturers ☆ *Good Tools Since 1836*

HELLER NUCUT WAVY TEETH FILES

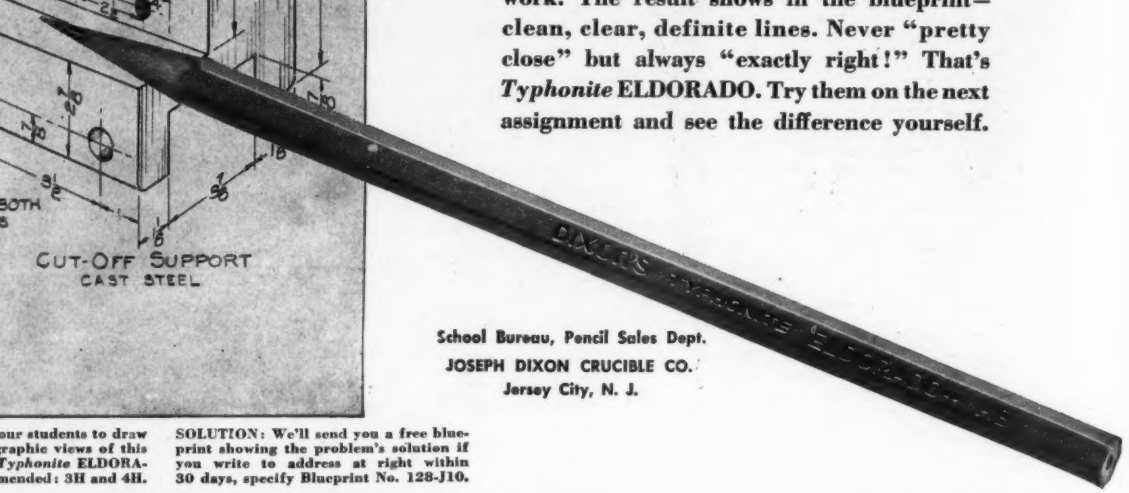
PATENT No. 2027039

LET THIS BE A LESSON FOR YOU_



Let the young draftsmen in your class tackle this problem. It's a good one—and highly instructive as you can see. Just have each student work out the correct orthographic views.

You'll make it easier for them by having *Typhonite* ELDORADO on the job. This great professional pencil is a real incentive to good work. The result shows in the blueprint—clean, clear, definite lines. Never "pretty close" but always "exactly right!" That's *Typhonite* ELDORADO. Try them on the next assignment and see the difference yourself.



School Bureau, Pencil Sales Dept.
JOSEPH DIXON CRUCIBLE CO.
Jersey City, N. J.

PROBLEM: Ask your students to draw the correct orthographic views of this Cut-Off Support. *Typhonite* ELDORADO degrees recommended: 3H and 4H.

SOLUTION: We'll send you a free blueprint showing the problem's solution if you write to address at right within 30 days, specify Blueprint No. 128-J10.

(Continued from previous page)

periodic meetings during the college year. Some of these summer sessions students have received bachelors, masters, and doctors degrees. Dr. F. Theodore Struck, head of the department of industrial education, has been a source of inspiration to all of the students. His scholarly, gentlemanly attitude has been a source of inspiration to all, and accounts for the high professional standing of the industrial teachers who have been his students. These men, seeking to show their appreciation to Dr. Struck, presented him with a life membership in the American Vocational Association as an expression from Alpha Chapter.

His experience as a writer, lecturer, state supervisor, teacher trainer, and consultant in the U. S. Office of Education have given him a rich background of experience which vitalizes the courses he teaches.

He has been secretary-treasurer of the Pennsylvania Vocational Association since 1938, and in this period the association has experienced a steady growth. He was also president of the National Association of Teacher Trainers for Industrial Education. He is author of several books in vocational education. His most recent one, *Creative Teaching*, is widely used as a text in industrial education courses. He also has contributed generously to professional magazines.

The members of Alpha Chapter wish Dr. Struck many more years of activity in this field of industrial education. They are sure that the men who follow his teaching will be the leaders in the larger program of vocational education which is to come.

From left to right on the banquet picture are: Joseph W. Giachino, James D. Wolfe, John W. Struck, Charles M. Foulds, Paul Detwiler, Everett M. Winslow, Rex Wright, Alva E. Horton, Frank E. Supplee, LeRoy Angle, John C. Stauffer, William H. Armstrong, and William A. Bartha.

At the speakers' table: George H. Resides, John F. Friese, Lester L. Fehr, Kenyon S. Fletcher, Alfred M. Andersen, F. Theodore Struck, Dean Marion R. Trabue, and Stanley J. Pawelek.

Annual Banquet, Alpha Chapter, Iota Lambda Sigma, The Pennsylvania State College, 1942

At the right side of table, beginning at the speakers' table: Edgar J. Spady, G. Harold Silvius, Clyde N. Utz, William R. Ballantine, George E. Thompson, Raymond R. Bloom, Clair F. Fitz, Floyd E. Shawda, William J. Ritter, Wayne V. Strasbaugh, Charles F. Zittle, Lloyd R. Cole, Claude H. Readly, Jr., and Jacob P. Sebastian.

♦ The 31st National Safety Congress and Exposition will be held October 27, 28, and 29. It will be housed in three big Chicago hotels—the Sherman, the LaSalle, and the Morrison. Convention headquarters will be in the Sherman.

Questions and Answers

A QUESTION OF PLASTICS

1086. Q.: The study of plastics is the subject that I am very deeply interested in. May I ask for your kind indulgence and assistance in helping me with my problems? I am endeavoring to locate a plastic which I could purchase in sheet or other bulk form, pulverize it and by the use of the proper solvent, dissolve it into a liquid state. I would want to use this liquid plastic for pouring into molds after being mixed with the proper catylist for curing by either low temperature (say around 175 deg. F.) or air curing. Too, I should like to be able to reduce the plastic to a still greater degree of liquidity and apply over objects by brushing or by the use of a spray gun, using compressed air. With this latter method of application I would very likely have to use high pressure and a gravity feed into the nozzle. I should like to be able to color this plastic when desired and to apply paint to it when necessary, using, of course, the special paint that would be designed for the plastic.

It may be that some of your issues have covered this subject and, if so, if they are obtainable, I should like very much to purchase them.

(Continued on page 26A)

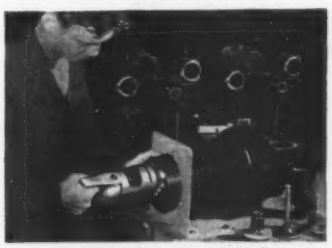
Train Students with War Industry's Favorite Electric Tools

Most students training for war work will find Black & Decker Holgun Drills and other Portable Electric Tools in the plants where they go to work. Because Black & Decker Electric Tools are war industry's first choice for building planes, ships, tanks, guns and other war essentials—just as they are for construction, all kinds of plant maintenance and automotive service work.

Train students with the same Black & Decker Tools they will use on the job. Phone your nearby Black & Decker Distributor. Let him demonstrate and help you select the right tools for your particular training program. Or write for complete catalog and free, instructive handbooks to: The Black & Decker Mfg. Co., 780 Pennsylvania Avenue, Towson, Maryland.

For Setting Studs in aircraft engines (illustrated), or driving anything from tiny screws to large nuts B&D Power Drivers speed many operations.

For Sheet Metal Cutting, B&D Lectro-Shears handle intricate work or straight line cutting at top speed. Available in 16-gauge and 18-gauge models.



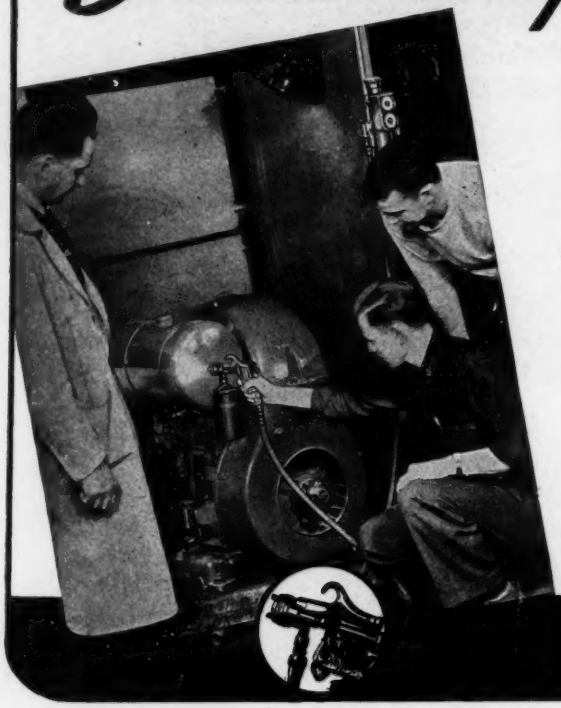
For Reconditioning Aircraft Valves and valve seats, B&D Elecric Valve Refacers and Valve Seat Grinders do factory-accurate work at war-emergency speed.

LEADING DISTRIBUTORS EVERYWHERE SELL

Black & Decker

PORTABLE ELECTRIC TOOLS

Shortcutting Apprenticeship



● Right now, the training of skilled labor is vital to the Nation's war production. You can help by making it possible for your students to complete their apprentice training faster. Teach them to use the very same kind of equipment they'll find on the job.

Wherever air-operated and air-handling equipment is used—whether in the large manufacturing plant or the small service shop—your students will usually find DeVilbiss Products.

The man best qualified to help you determine the types of air-using and handling equipment found in most of your local industries is the one who sold them—the DeVilbiss man. He will gladly assist you to solve any problem you may have on shop expansion, production procedure and equipment.

THE DEVILBISS COMPANY • TOLEDO, OHIO
Canadian Plant: WINDSOR, ONTARIO

Spray Finishing Equipment • Portable Spray Painting Outfits • Exhaust Fans • Spray Booths • Air Compressing Outfits • Hose and Connections • Air Dusting Guns • Oil Guns • Equipment for Offset Prevention in Printing.

Ask for it! "The ABC of Spray Painting" contains 30 pages of helpful information on the operation of spray painting equipment. And you get it free.

DE VILBISS SPRAY SYSTEMS

(Continued from page 24A)

If you are unable to furnish me with the above information, will you kindly put me in touch with plastic manufacturers who might be able to supply me with the desired materials.

I have used several different kinds of liquid plastic but the extremely high cost makes it prohibitive for use on a commercial scale.

A.: Relative to your question on plastics I would suggest that you write the Plastics Institute at 9 Rockefeller Plaza, New York City. This is a nonprofit organization, and they will no doubt give you such information as they can on the points that you want to take up. I am also giving you the following addresses of manufacturers of the various types of plastics:

Manufacturers of Cast Phenolics (Wholesale only)

A. Knoedler Co., Lancaster, Pa. (Gemstone).

Bakelite Corp., 247 Park Ave., New York, N. Y. (Bakelite Cast Resinoids).

Catalin Corp., 1 Park Ave., New York, N. Y. (Catalin).

E. I. Du Pont de Nemours & Co., Inc., Arlington, N. J.

Marblette Corp., 37–21 30th St., Long Island City, N. Y. (Marblette).

Monsanto Chemical Co., Springfield, Mass.

Manufacturers of Cellulose Acetate (Wholesale only)

Bakelite Corp., 247 Park Ave., New York, N. Y.

E. I. Du Pont de Nemours Co., Inc., Arlington, N. J. (Plastecele).

Celluloid Corp., 10 E. 40th St., New York, N. Y. (Lumarith).

Monsanto Chemical Co., Springfield, Mass.

Tennessee Eastman Corp., Kingsport, Tenn. (Tenite).

Manufacturers of Acrylic Resins

E. I. Du Pont de Nemours Co., Inc., Arlington, N. J. (Lucite) (Wholesale only).

Rohm & Haas Co., Inc., 222 W. Washington Square, Philadelphia, Pa., (Plexiglas) (Wholesale and Retail).

Manufacturers of Laminated Phenolic Sheet

Formica Insulation Co., 4613 Spring Grove Ave., Cincinnati, Ohio.

Mica Insulator Co., 200 Varick St., New York, N. Y. (Lamicoid).

National Vulcanized Fibre Co., Wilmington, Del. (Phenolite).

Westinghouse Elec. & Mfg. Co., Trafford, Pa. (Micarta).

MATCHING WALNUT FINISHES

1084. Q.: I have the interior of a superintendent's office to refinish in a rich walnut to match a new set of solid walnut furniture. The wall of the office is sheathed up to a 4-ft. height. The woodwork to be refinished is ash; it must show a grain. My problem is to strip (or any other method) and restain and varnish the ash to match a rich chocko brown of the walnut furniture.—*W. T.*

A.: In tackling the job of refinishing ash trim in walnut you have undertaken a very tough proposition, since the bold, open, and very coarse grain of ash in no way resembles black walnut, regardless of any attempt at matching color. However, if the following specifications and materials are applied with a quite reasonable amount of skill, good results may be expected.

1. Use a wax-free type of varnish remover (as made for the auto refinishing trade) to soften areas about 1 ft. square. Speed up the work of getting off the old finish with wide flexible putty knives and No. 2 steel wool. Following this with more steel wool and denatured alcohol (shellac-mixing grade), proceed to clean up to completely bare wood with solvent, wet burlap squares, and then with clean rags. Trim a 6-in. length of birch dowel rod to a pencil point on one end and a skew chisel on the other. With this and alcohol wet rags, run all molding and panel lines to secure clean margins. Dry all stripped work overnight.

2. Sand all surfaces with 4/0 garnet finishing open coat paper and wood block faced with ½ in. of sponge rubber. The wood must be cut to clean, white surfaces free from all traces of old finish.

3. Make up a match color stain. Try the color on an out-of-sight spot first as a guide for strengthening or diluting, as required, but a four ounce standard solution will probably be about right. Apply with a 3-in. black china bristle brush and blend with a rag if needed. Let dry overnight. Do not sand.

4. Use a spray gun and portable compressor to apply a sealer coat of shellac-mixing lacquer. Brush coating will probably not be satisfactory in this case, since the sealer must be applied light and very evenly with no trace of thick or thin portions. Dry hard and sand very smooth with 6/0 garnet finishing paper moistened on the back to increase flexibility.

5. Apply a coat of match color silex base wood filler. Let set enough to lose the gloss and then pad in with burlap cloths across the grain so that the very coarse grain is completely leveled. Use clean rags to remove all remaining traces of filler. Inspect closely. Dry 24 hours.

6. Apply a lacquer shade coat as per directions on page 6, *Wood Finishing and Painting Made Easy*, Formula D, published by The Bruce Publishing Co., Milwaukee, Wis. Color number is from Pylan Products Co., 799 Greenwich St., Brooklyn, N. Y., the color being soluble in lacquer solutions. Use as a not too heavy shade coat to even up all off-tone portions and produce a match color with the new furniture. This is about the only manner in which the ash can be matched up anywhere near the walnut in tone

(Continued on page 29A)

TEST JACK FOR TESTING WELDS

A. F. DAVIS
Cleveland, Ohio

The training of hundreds of new welding operators throughout the country to meet war demands has made it necessary to test the work of new welders faster than ever before and at the same time more carefully.

To speed tests of welds, technicians at the B. H. Leonard Welding School of St. Louis, Mo., and the Midwest Piping and Supply Co., designed the all-welded test jack shown herewith.

Sturdy welded test jack

—Photo courtesy The Lincoln Electric Company, Cleveland, Ohio.

The device, a front view of which is shown in Figure 1, consists of a sturdy frame built around a hand-operated hydraulic jack. It is used for making free-bend, side-bend, and back-bend tests on weld coupons. The organization uses it as standard equipment for testing arc-welding operators on field construction jobs.

It was made from scrap pieces of steel.

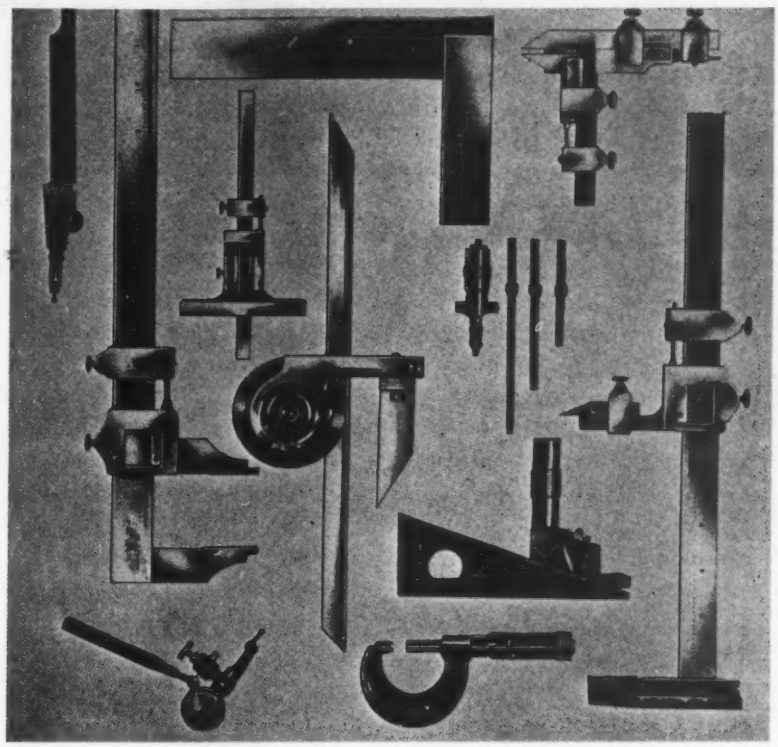
The hydraulic jack used is rated at eight tons, so the frame must be made sturdy to stand the strain.

The male member of the guide-bend die may be seen forcing the 3/8 in. thick standard test piece into the female side of the die.

The side and top members of the frame were made of mild steel, 6 in. wide and ½ in. thick. The sidepieces are approximately 24 in. long and the top members 9 in. The bottom base plate is 9 in. square and 1 in. thick.

The male member of the die is 1½ by 2 by 6 in. The upper end was machined to a ¾-in. radius, and the lower end welded to the upper surface of the jack.

The female part of the die also was 2 in. thick and its curved portion was machined to a 1 3/16-in. radius. The lower corners of the female portion of the dies were rounded off as shown.



You can tell the young men who are just beginning to appreciate the value and importance of fine precision tools this:

Starrett Tools shall continue to merit the trust of the skilled machinists who work with them.

While exerting every effort to meet the extreme demands of the war production program, The L. S. Starrett Company intends to maintain the standards for accuracy and workmanship that users of Starrett Tools have learned to count on for over 60 years.

Ask your supply house to show you The Starrett Book for Student Machinists—only 75c a copy.

THE L. S. STARRETT CO., ATHOL, MASSACHUSETTS, U. S. A.

World's Greatest Toolmakers

Precision Tools . Dial Indicators . Ground Flat Stock . Hacksaws . Metal Cutting Band saws . Steel Tapes

QUESTIONS AND ANSWERS

(Continued from page 26A)

especially if a grain must show as you have specified. Do not sand this coat.

7. Spray on a gloss coat of wood lacquer or varnish as desired. Be careful to avoid sags or thin areas. Let dry according to material used and sand with 6/0 paper moistened on the back and after dusting off carefully follow with a tack rag before applying the last coat of lacquer or varnish, eggshell type, with the gun. If this coat gives a satisfactory sheen, leave it alone. If a different sheen is desired, use flat folded pads of No. 2/0 steel wool loaded with floor wax to rub the well-dried last coat. Polish with a bristle shoe brush, or cotton flannel rags as desired. This last type of finish is particularly fine.—*Ralph Waring.*

News Notes

♦ "Education for Free Men" is the theme of the 22nd annual observance of American Education Week. This theme is most fitting at a time when the entire world is at war to determine whether freedom or tyranny shall prevail among men.

American Education Week is a time for a concerted effort on the part of all school systems throughout the nation to help the public understand why education is more and not less important as a result of the urgency of the war effort. It is a time for interpreting to the people what the schools are contributing to the war effort and the part that they must play in the peace that is to follow after military victory is achieved.

The National Education Association has prepared materials to assist local school systems in

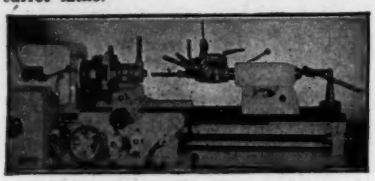
(Continued on page 32A)

Shop Equipment News

New Products — Publications

CONVERTING YOUR ENGINE LATHE

"Tail Stock Turret," and "Tail Post Turret," two attachments designed by the Jefferson Tool Co., permit conversion of any engine lathe into a turret lathe.



Converted engine lathe

The Tail Stock Turret is a modernized 5-tool turret made in four sizes to fit small bench lathes and lathes up to 24-in. swing. It has the adjustable pull feel lever.

The Tool Post Turret has a capacity of four standard tool holders and is easily mounted on cross slide or compound rest. Both are precision made attachments.

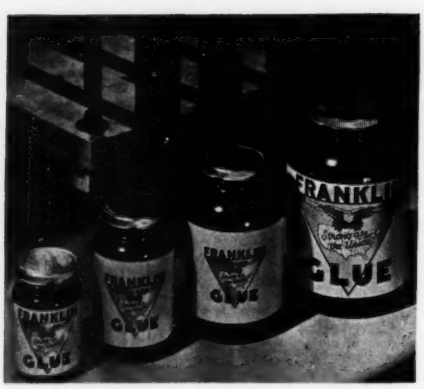
Jefferson Machine Tool Co., 652–672 W. 4th St., Cincinnati, Ohio.

For brief reference use IAVE—1012.

WARTIME GLUE CONTAINER

The new "wartime" container for Franklin Liquid Hide Glue has several advantages over the old metal container, discarded because of priorities.

These new bottles, pictured in the quarter-pint, half-pint, pint, and quart sizes, have a larger opening to facilitate the use of a brush in the original container.



Liquid Hide Glue Container

These new bottles are more attractive, too. Made of glass, they are dark blue with contrasting orange labels.

For shipping they are individually packed with sawdust, although they are sturdy and can withstand almost as hard a shock as a metal container.

The Franklin Glue Co., Columbus, Ohio, plans to continue to serve schools and the homecraftsmen with this liquid hide glue which requires no heating or mixing.

The Franklin Glue Co., Columbus, Ohio.

For brief reference use IAVE—1021.

NEW LYON TOOL STANDS

The new tool stands recently announced by Lyon Metal Products, Inc., 3225 Clark St., Aurora, Ill., are very handy for efficient individual storage of tools for workers on one, two, or three-shift operations.

These tool stands are useful around production machines and toolrooms as toters up to the job;

Lyon tool stands

for assembly lines, parts and tool transporters for maintenance men, equipment carriers for inspectors and for stock picking and transportation.

Drawers can be locked to guard against thieving of important tools. Drawers feature easy sliding and flat key lock.

For brief reference use IAVE—1018

TIPS FOR TOOL USERS

A valuable little book for the user of tools (mechanic and hobbyist) is the "Disston Saw, Tool, and File Manual" a 48-page book with 200 illustrations.

The manual contains valuable tips and advice on how to choose and use handsaws, small saws, and circular saws. Other sections are devoted to the sharpening of saws, data on hack saws, and information on miter squares, try squares, bevels, gauges, levels, and other similar tools.

Copies may be obtained without cost from any hardware dealer or direct.

Henry Disston & Sons, Inc., Tacony, Philadelphia, Pa.

For brief reference use IAVE—1022.

CUTTING SCREW THREADS

"How to Cut Screw Threads," a 21-page booklet covering the cutting of screw threads on back-geared screw-cutting lathes, has just been reprinted.

Contained in the booklet is complete information on the various types of lathe tools employed in cutting screw threads, and using center gauges, compound rests, cutting stops, dial indicators, taps, dies, etc. Types of screw threads commonly used are fully described with formulas and diagrams of standard screw-thread forms.

This booklet (Bulletin No. 36A) is priced at 10 cents a copy.

South Bend Lathe Works, Dept. K–7, South Bend, Ind.

For brief reference use IAVE—1015.

CARE AND OPERATIONS OF PORTABLE PRECISION LATHE GRINDERS

The third edition of the above-named booklet has been published by the Dumor Co., Racine, Wis. This booklet contains 20 pages of valuable information and is copiously illustrated.

Following are a few of the chapter headings: The History of Grinding, Selecting the Grinder, Necessity for Safety Precautions, Mounting the Grinder on a Shaper, The Assembly of Dumore Grinders, Dressing the Wheel for Precision Grinding, Reasons for Chatter and Method of Elimination, Thread Grinder Attachment, Hand Grinders, and Special Applications.

Price per copy 25 cents. The Dumore Co., Dept. 232–D, Racine, Wis.

For brief reference use IAVE—1023.

MOUNTED WHEEL MANUAL

Concise and detailed information on the selection and application of mounted wheels, steel cutters, drills and a list of other time-saving accessories for use with portable equipment is given in an informative booklet entitled, "Mounted Wheel Manual," published by the Chicago Wheel and Manufacturing Co.

Contents of the booklet include: a list of all types of mounted wheels and a wide array of accessories for use with high-speed portable equipment; a selection guide and a section devoted to the newly developed time-saving Mounted Polishing Wheel.

Chicago Wheel and Manufacturing Co., 1101 W. Monroe St., Chicago, Ill.

For brief reference use IAVE—1011.

MANUAL ON LATHE OPERATIONS

Apprentices and student machinists will find the 104-page, pocket-size manual "The Care and Operation of a Lathe" both interesting and instructive.

Illustrated and explained are: The modern back-geared, screw-cutting lathe; its parts and their functions; oiling and proper care of a lathe; the grinding of cutters; modern lathe tools and the performance of basic lathe operations.

Price — single copy 50 cents with discounts for schools.

Sheldon Machine Co., Inc., Chicago, Ill.

For brief reference use IAVE—1010.

RADIO INSTRUCTIONAL AIDS

Instructors of radio training courses in schools will find the handy pocket-size book and the kit of educational aid published by the Allied Radio Corp. excellent for reference and home study assignment purposes.

The contents of the handy pocket-size book cover such often referred to data as fundamental algebraic formulas, standard mathematical and radio symbols, a new simplified metric conversion chart, etc.

The kit of educational aids consists of: project circuit diagrams with parts lists for the construction of receivers, transmitters, test instruments, etc.; a copy of "A Dictionary of Radio Terms" which contains over 800 definitions of the most commonly used terms in radio, electronics, and television; and a copy of "Radio Builder's Handbook," with 36 pages of basic radio theory and construction in simple language.

Copies are free to directors, principals, and instructors of training programs, for distribution to all students. Requests should be written on school letterheads, stating the type of program, and the number of instructors and students.

Allied Radio Corporation, Room 100, Educational Division, 833 W. Jackson Blvd., Chicago, Ill.

For brief reference use IAVE—1014.

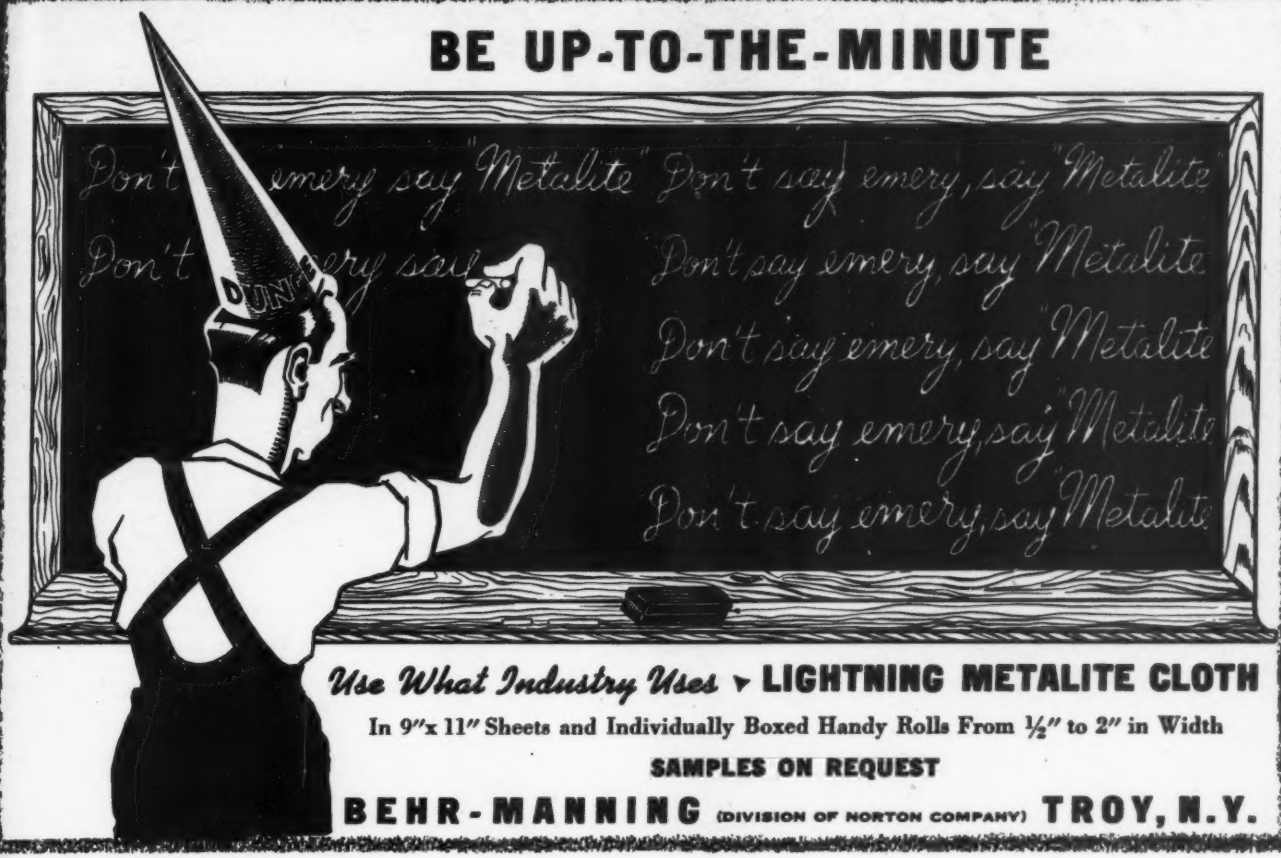
PRODUCTION AWARD

The presentation of the Army-Navy production award pennant was made to the Le Blond Machine Tool Co., Cincinnati, Ohio, on Thursday, September 8, 1942. The award consists of the Army and Navy "E" pennant, to be flown above the plant and a lapel pin, a symbol of high service to America for the entire company personnel. Among other plants recently selected to receive this award are the following: Armstrong Bros. Tool Co., Chicago, Ill., and Kearney and Trecker Corp., Milwaukee, Wis.

Above all things I hope the education of the common people will be attended to; convinced that on their good sense we may rely with the most security for the preservation of a due sense of liberty.

— *Thomas Jefferson*, 1787

BE UP-TO-THE-MINUTE


Don't say emery say "Metalite" Don't say emery, say "Metalite
Don't say emery, say "Metalite
Don't say emery, say "Metalite
Don't say emery, say "Metalite
Don't say emery, say "Metalite
Don't say emery, say "Metalite

Use What Industry Uses ▸ **LIGHTNING METALITE CLOTH**

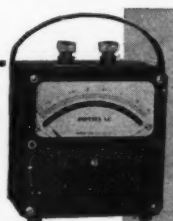
In 9"x 11" Sheets and Individually Boxed Handy Rolls From ½" to 2" in Width

SAMPLES ON REQUEST

BEHR-MANNING (DIVISION OF NORTON COMPANY) **TROY, N.Y.**

FOR INSTRUCTION, TOO... Industry's Test Instruments

COST LESS... BECAUSE OF THEIR LONG-LIFE DEPENDABILITY!



WESTON

MODEL 430

A-C AND D-C

INSTRUMENTS

Ideally suited for classroom instruction and student use because of their dependability, ruggedness and relatively low cost . . . features which have made the Model 430 line so universally preferred throughout industry. Have hand-calibrated mirror scales of long length, with large scale openings. Accuracy within ½ of 1%. Sturdy Bakelite cases give added protection in service. Extremely compact. Available in complete line of A-C and D-C instruments.

RELAYS
Sensitive and Power Uses
Current and Voltage Types

SERVICE EQUIPMENT
Tubecheckers, Analyzers, Oscillators, Ohmmeters, Vacuum Tube Voltmeters

LIGHT MEASURING DEVICES
Illumination Meter, Foot Candle Meters, Sight Meter, Exposure Meters

SPECIALIZED TESTING EQUIPMENT
Power Analyzer, Photoelectric Potentiometer, Battery Testing Instruments

PANEL MOUNTING INSTRUMENTS
Ammeters, Voltmeters, Wattmeters, Galvanometers, Microammeters, Ohmmeters, Microfarad Meters

INSTRUMENT TRANSFORMERS
Portable and Switchboard -- Potential and Current

PORTABLE INDICATING INSTRUMENTS
Ammeters, Voltmeters, Wattmeters, Galvanometers, Microammeters, Ohmmeters, Microfarad Meters

LABORATORY STANDARDS
Voltmeters, Ammeters, Wattmeters

STANDARD CELLS

WESTON

MODEL 785

INDUSTRIAL

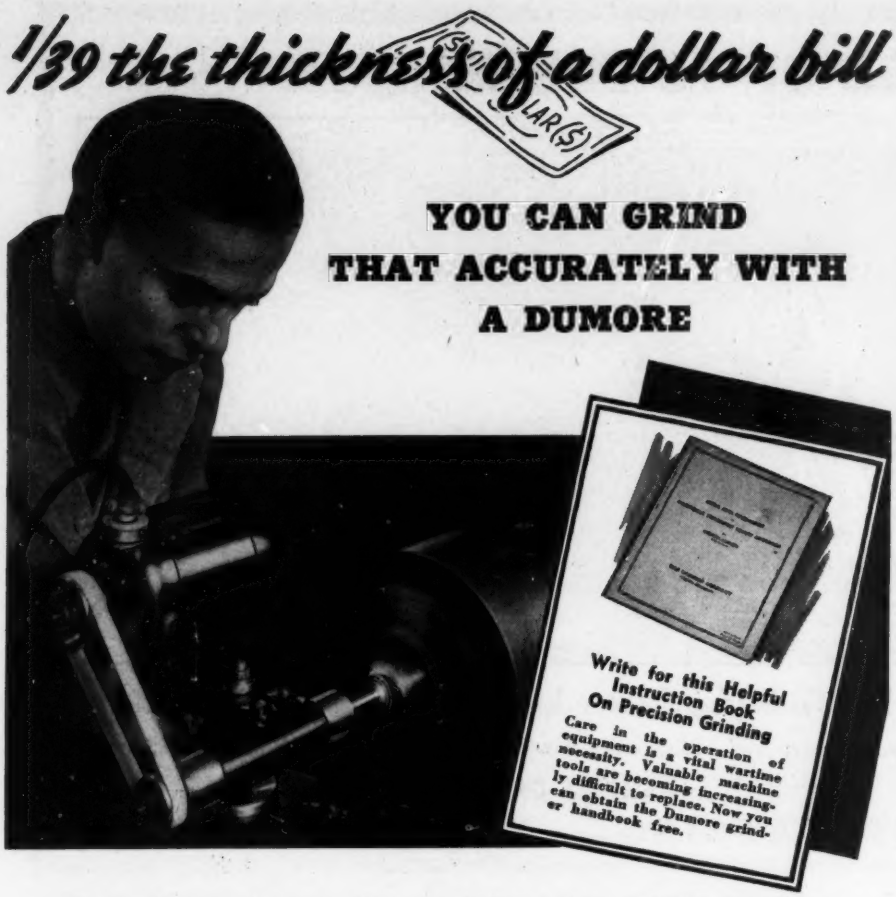
CIRCUIT TESTER

A complete circuit tester for shop or laboratory. Has 27 voltage, current and resistance ranges (d-c voltage sensitivity 20,000 ohms per volt), for checking motor and control circuits, lighting circuits, sensitive relay circuits, communication circuits, etc., etc. Also available with compact resistance tester for checking insulation and cable covering resistance values up to 900 megohms.

WESTON ELECTRICAL INSTRUMENT CORPORATION

595 Frelinghuysen Avenue, Newark, N. J.

1/39 the thickness of a dollar bill


YOU CAN GRIND
THAT ACCURATELY WITH
A DUMORE
Write for this Helpful Instruction Book On Precision Grinding
Care in the operation of equipment is a vital wartime necessity. Valuable machine tools are becoming increasingly difficult to replace. Now you can obtain the Dumore grinder handbook free.

Photomicrographs show that a grinding wheel actually cuts like thousands of little cutting tools, but with infinitely greater accuracy, leaving a mirror-like finish. High speed, vibrationless Dumore grinders are accurate to .0001" . . . capable of grinding within 1/39 the thickness of a dollar bill. Instructors and machine shop foremen are finding Dumore grinders ideal for training young machinists and tool makers. They're so easy to set up in so many different ways, for internal and external precision grinding to tolerances formerly unattainable except on larger, more costly tools.

THE DUMORE COMPANY, Dept. 232K, Racine, Wisconsin

Dumore PRECISION Grinders

NEWS NOTES

(Continued from page 29A)

the observance, among which are posters, leaflets, stickers, manuals, plays, and other materials. Write to the National Education Association, 1201 Sixteenth St., N.W., Washington, D. C., for complete information.

♦ Indications that the vocational school training of war-production workers would reach the goal of 2,500,000 set for the year that started July 1, were recently given by Dr. L. H. Dennis, executive secretary of the American Vocational Association.

A rapidly increasing demand for girl and women workers for manual jobs in war industries is causing additional public vocational school shops to go on a 24-hour day, 7-day week, training schedule. More than 600 school shops are now operating three shifts a day.

Actual figures now available in the U. S. Office of Education, where the program is supervised, show that 2,540,946 had been trained for war jobs or were in classes by the end of May, 1942, when these classes, which had been started July 1, 1940, had been in operation for a period of 23 months. Active enrollments at that time totaled 357,157, an increase of nearly 153,000 over May, 1941.

In addition to this program, state and local vocational directors and teachers are active in scores of communities in training civilian workers for the U. S. Army Air Force, Signal Corps, and Quartermaster Corps. More than 100,000 have been trained for such jobs. Approximately 22,000 such workers are turned out every four to six weeks.

♦ L. H. Dennis, executive secretary of the American Vocational Association, recently called attention to the fact that when in-school youth are placed in part-time jobs related to their high school courses of study, they are directly or indirectly contributing to the over-all war effort.

Any well-organized school community can provide for such service by taking advantage of existing legislation. They can engage the services of vocational co-ordinator to organize work adjustment experiences for academic as well as vocational high school boys and girls. These students then divide their time between class instruction and work on a related job in the community.

By this method, students trained under skilled supervision in dime stores, general stores, service stations, dental and doctors' offices, insurance offices, banks, garages, railroad offices and yards, county courthouses, highway shops, and other establishments, have yielded more than enough jobs to go around.

♦ New or revised models available for classroom vocational educational war training and civilian pilot training are announced by the War Training Models Unit of the WPA as follows:

U. S. Army version of the Piper Club airplane, mounted on swivel joint for instruction in flight maneuver; U. S. Navy Bureau of Aeronautics model of radial airplane engine; large demonstration models of conventional type of sextant and the Link bubble-type sextant; blackboard globe 24 in. in diameter with swinging protractor for calculating navigational problems; half-width of the cargo carrier C-2 on scale ¼ in. to the foot; transparent plastic and hardwood models of technical drawing problems; a set of 18 models of mechanisms most commonly employed in construction of American machinery.

Classroom-size instructional models made by the WPA project are now in use in war-training centers in 42 states. Inquiries should be addressed to the WPA State Office, 100 North Cameron Street, Harrisburg, Pa.

♦ Aimed at weeding out unsuitable teaching talent from Texas grade school classrooms, the University of Texas has set up three tests to be given to all students majoring in elementary education.

Beginning this fall, each student entering this department will have to pass tests on the subject he plans to teach, and on both speaking ability and hearing ability.

Students with speech faults will be advised to study speech or to register in the university's speech correction clinic, while those with poor hearing will be advised to enter some vocation other than teaching, he said.

No student will be granted a degree in the elementary education field until he can pass all three tests, he added.

♦ The State Board of Control for Vocational Education, Lansing, Mich., has recently issued Bulletin No. 280 entitled "The Fireman and Electrical Equipment." The purpose of the booklet is to aid firemen in dealing with hazards encountered through handling dangerous electrical equipment. The material is presented under the following general headings: overhead lines—general; overhead lines—wires down or sagging; overhead lines—cutting wires; underground lines; electric substations; high-voltage customer installations; low-voltage customer installations; lineman's rubber gloves; and grounding aerial trucks.

The work was prepared by Harry Callahan, chief, Detroit Fire Department Training School; Thomas Diamond, University of Michigan; Robert Loughead, Michigan Inspection Bureau; and George H. Fern, director, State Board of Control for Vocational Education, with the help of representatives of the Detroit Edison Co.

♦ Opportunities for those interested in occupations in music are described in a six-page leaflet which covers the nature and variety of jobs in the field, earnings, training required, probable trends, and other advantages and disadvantages.

This career material should be of interest also to teachers, counselors, parents, and professional musicians.

Single copies 25 cents each, cash with order, from Occupational Index, New York University, New York City. In quantities the price is

(Continued on page 35A)

Is Your Electrical Instruction ON THIS WARTIME BASIS?

Step-Up Speed, Efficiency

STANDARD TEST AND DISTRIBUTION PANELS

Industry's demand for more and more technicians makes faster curricular schedules imperative. Standard Test and Distribution Panels help to speed-up electrical training as well as make it more interesting and effective.

Standard Panels, providing exceptional operating flexibility and speed in connection changes, are adaptable to both elementary and advanced instruction. These panels are easy to operate, substantially built for years of service. Offered in a wide range of models for shops and laboratories.

"Standard Makes Every Minute Count"

THE STANDARD ELECTRIC TIME COMPANY

79 LOGAN ST., SPRINGFIELD, MASS. BRANCH OFFICES IN PRINCIPAL CITIES

(Continued from page 32A)

$5 a hundred. This is one of a series covering 67 different occupations.

♦ The School of Design in Chicago, 247 East Ontario Street, of which L. Moholy-Nagy is the director, announces its wartime program which will divide the school year into three terms: fall term of 18 weeks, spring term of 17 weeks, and summer term of 11 weeks.

This new arrangement of the curriculum shortens the four years' course for designers to two years and nine months (8 terms), and the six years' course for architects to four years (12 terms).

The school has been able to develop a number of *war designs and substitutes* for priority materials. It will continue its very successful *camouflage course*, in which the principles of camouflage, military as well as industrial, are taught.

♦ Qualified personnel administrators are currently in demand for government service in Washington and all parts of the country, particularly in the Federal Civilian War Agencies.

Personnel administrators are needed for filling the positions of Personnel Officer ($4,600 to $6,500) and Personnel Assistant ($2,600 to $3,800). These men and women will work in one or more of the special fields of position classification, recruitment, placement, training, or employee relations; or have charge of personnel administration of a federal agency.

Applicants for all positions above the $2,600 grade must have had successful, full-time, paid experience in a regularly constituted personnel agency of a commercial or industrial concern, or of a federal, state, or local government, using modern techniques and conducting a comprehensive program of personnel administration; or in a responsible executive or administrative position in industry or in government, with a record of systematic and successful employee selection, training, supervision, and leadership.

Copies of detailed announcements on the positions to be filled and application forms may be obtained at first and second-class post offices throughout the country, or direct from the commission in Washington. Applications will be accepted until the needs of the service have been met.

♦ Enginemen (steam-electric) are needed to be in charge of heating, refrigerating, and ventilating systems in federal buildings in Washington, D. C. The United States Civil Service Commission is recruiting enginemen for positions paying from $1,680 to $2,040 a year.

The federal civil service offers enginemen the opportunity to gain experience in diversified types of equipment. Advancement may be rapid, depending on the ability of the individual to accept responsibility and to broaden his knowledge.

Experience in the operation or installation of air-conditioning equipment will be accepted as qualifying. Applicants for all positions must show experience with electrical machinery. Experience in the operation of Diesel, air-conditioning, or refrigerating equipment is desirable, but not essential.

For the $1,680 positions, applicants must have had one year of experience either as enginemen, assistant engineman, or fireman in a steam-electric power plant, or in the operation or installation of air-conditioning equipment, or one year of paid experience in charge of the mechanical and electrical equipment of a building.

For the $1,860 positions, the requirement is either two years of experience as watch engineman in a steam-electric power plant, or eighteen months in the operation or installation of air-conditioning equipment, or three years of paid experience in charge of the mechanical and electrical equipment of a building.

For the $2,040 positions, applicants must have had either two years of experience in responsible charge of the operation of a steam-electric power plant or in the operation or installation of air-conditioning equipment, or three years as watch engineman in charge of the operation of a steam-electric power plant, or five years in responsible charge of the operation of the steam and electrical equipment of a building.

There is no education requirement. There are no age limits. Filing application forms, obtainable at first and second-class post offices, is all that is necessary to be considered. Applications must be filed with the Civil Service Commission, Washington, D. C., and will be accepted until further notice. Qualified persons are urged to apply at once.

New Publications

Machine Shop Training Series

Developed by the staff of the William Hood Dunwoody Institute. Published by the American Technical Society, Chicago, Ill.

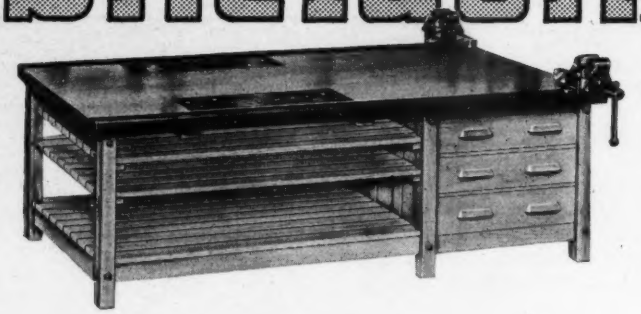
All the job-training units in this series are bound in paper covers with a mechanical wire binder, and are uniform in size, 8½ by 10⅞ in., illustrated.

Instructor's Guide, 39 pages. Price, 75 cents; *Bench Work*, 155 pages. Price, $1.35; *Drill Press*, 103 pages. Price, $1.25; *Lathe*, 143 pages. Price, $1.35; *Shaper and Planer*, 115 pages. Price, $1.25; *Milling Machine*, 110 pages. Price, $1.25; *Grinder*, 111 pages. Price, $1.25.

Each of these separate units presents a definite number of jobs which acquaint the student with the tools to be used for doing the given job, give him the operating steps, list precautions that are to be observed, pose a number of questions which the student is to answer, and then gives a list of references so that the student can acquaint himself still farther with the information that should be amassed if one wants to become a real all-round machinist or efficient machine operator.

(Continued on following page)

★ ★ ★ Sheldon ★ ★ ★
VOCATIONAL TRAINING BENCHES



No. N-60 Sheet Metal Bench—96" x 40" x 32" High

Our men in the front lines have the finest fighting equipment. The men behind the men at the front, those in industry engaged in the war effort, must also have the finest equipment. Sheldon vocational tables and shop benches, proved by over 40 years of experience, are the very finest obtainable. They are being used in civil and armed force training schools throughout the country.

Write today for our shop bench catalog.

SHELDON ALSO MANUFACTURES A COMPLETE LINE OF SCIENCE LABORATORY, HOME ECONOMICS, AND ART FURNITURE.

E. H. SHELDON & COMPANY
723 NIMS ST. MUSKEGON, MICHIGAN

(Continued from previous page)

The Mathematics of Wireless

By Ralph Stranger. Cloth, 215 pages. Price, $3. Published by Chemical Publishing Co., Brooklyn, N. Y.

This is a completely revised and enlarged edition. It is especially prepared for the amateur in such a manner that the mathematics is simplified as much as possible.

The method of describing the extraction of square and cube roots is especially interesting.

The contents is divided into 19 chapters under the following headings: A survey of modern scientific ideas on electrical energy; amongst the first men; a nibble at arithmetic; series and parallel connections; a nibble at algebra; a nibble at geometry; powers and roots; a nibble at trigonometry; the mathemtics of alternating currents; the mathematics of wave length and frequencies; a nibble at differential calculus; a nibble at integral calculus; logarithms; a review of the mathematics of the electrical and the magnetic circuits; efficiency; curves and graphs in wireless; a survey of units and definitions; and the slide rule.

Theory of Flight and Aircraft Engines

By Bert A. Shields. Cloth, 377 pages, 6¼ by 9⅛ in., illustrated. Price, $2.75. Published by McGraw-Hill Book Co., New York City.

This second edition is a revised and enlarged treatment of the author's former volume on "Air Pilot Training." It contains all the information necessary for passing the written examination required for the private or commercial pilot license.

The material has been written so that those who have had no previous technical education will have no great difficulty in learning the principles and their application to the beginner.

In Part I, "Aircraft and Theory of Flight," is considered under the following headings: the development of the airplane, nomenclature, elementary physics, airfoils, forces in flight, the controls, flight instruments, and the parachute.

Part II treats of the engine, its care, and operation; and of the instruments with which the pilot must be conversant.

How to Remodel a House

By J. Ralph Dalzell and Gilbert Townsend. Cloth, 528 pages, 5¾ by 8½ in., illustrated. Price, $4.75. Published by American Technical Society, Chicago, Ill.

This book treats the subject of remodeling houses quite fully. It is well illustrated and is filled with practical applications of how to modernize old installations.

The subject is treated under the following headings: types of house architecture; how to read architectural plans; specifications; fundamentals of remodeling; how to select architectural types; architectural drawings; structural details; stairs; insulation; selection of materials; bathrooms; remodeling kitchens; heating and air conditioning; electric lighting and wiring; remodeling rooms; floor plans and elevations for remodeling; and an illustrative example. There is an index and also 10 blueprints for instruction relative to how to remodel a house.

Strength and Properties of Materials

By John Elberfeld. Cloth, 150 pages, 6¼ by 9⅜ in., illustrated. Price, $1.75. Published by Harper & Brothers, New York and London.

This book is written for those who are preparing to enter industry, or those who are already engaged in industry who need to know something about product design and the materials used in production.

The text covers: riveted and welded joints, properties of material, manufacturing processes, heat-treatment of steel, properties of ferrous and nonferrous metals and alloys, beam design, columns, shafts, plain, and reinforced concrete, and plastics.

A number of worth-while tables have been placed in the appendix.

General Printing

By Glen U. Cleeton and Charles W. Pitkin. Paper, 7¾ by 10¼ in., 167 pages, illustrated. Price, $1.60. Published by McKnight & McKnight, Bloomington, Ill.

This book, consisting of 112 units, contains in terse yet clear statements what the general student in junior high or senior high school industrial-arts work ought to acquire about the subject of printing.

The material in the book seems to cover the three objectives which the authors set up for themselves in the statement of what they hope to accomplish: That the student become reasonably proficient in the mechanical details of the printer's trade; that they learn something about the history of the art, and develop an understanding of its importance to the progress of civilization; and that they will acquire consumer appreciations about the products turned out by the printer.

Eye Hazards in Industry

By Louis Resnick. Cloth, 321 pages; price, $3.50. Published by Columbia University Press, New York, N. Y.

This book is the direct product of many personal investigations of industrial plants, interviews with industrial workers, foremen, safety directors, doctors and nurses, and finally with those whose eyes have been injured. It is, furthermore, the result of the collaboration of hundreds of safety engineers, physicians, surgeons, executives, government officials, insurance men, safety device manufacturers, dealers, and consumers.

It is a handbook for safety engineers, safety inspectors, and all connected actively in accident prevention generally, and sight conservation in particular. It also may be used as a textbook for engineering schools, vocational training advisers, and all others engaged in preparing youth for work in industry.

Shopcrafter's Manual

By Nelson L. Burbank and E. M. Mitchell. Cloth, 141 pages, 8⅝ by 11¼ in., illustrated.

(Continued on page 40A)

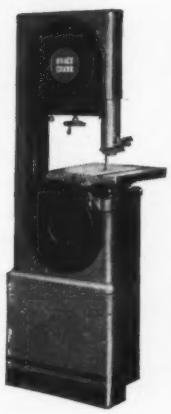
BOICE-CRANE'S
Great New
14" BAND SAW

Step up to a new Boice-Crane 14" Band Saw. Start a heavy piece of hardwood through. You'll get the greatest sensation of smooth, effortless sawing you've ever had. The super-rigid welded steel frame, the direct-drive motors and other features are all engineered to produce smoother, faster cuts.

SAFETY ENGINEERED FOR SCHOOLS

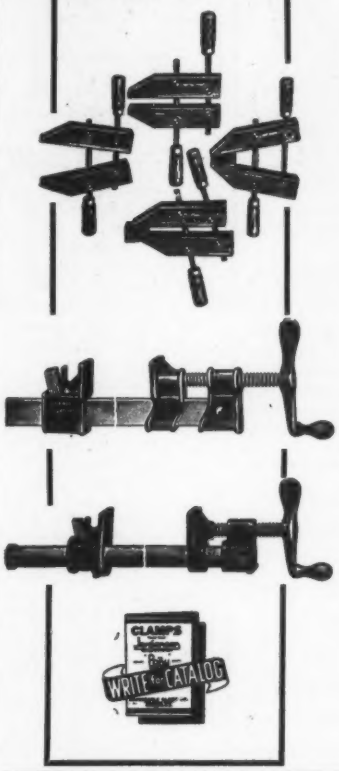
★ The Boice-Crane with its safety-sealed frame, is the safest 14" band saw built. Models with direct-drive motors even eliminate the usual v-belt drive.

★ Not even a fraction of an inch of blade is exposed. The new, higher wheel speed of a Boice-Crane lets the blade almost "melt" through the work, eliminating the former hazard of halty, jerky cutting.



FREE! *New Complete Catalog*

TRADE MARK
"Jorgensen"
REG U S PAT OFF



stands for highest quality

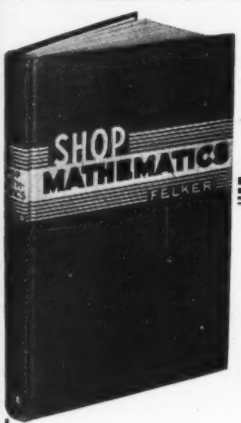
CLAMPS

It is not enough merely to specify "JORGENSEN" when ordering. You should look for the "JORGENSEN" Trade-mark on the handscrews which you receive to avoid future disappointment. Genuine "JORGENSEN" handscrews have clear, strong well-seasoned jaws, with handles that do not loosen, with long-wearing threads, and nuts that do not break. They will stand "schoolboy" service. Look for the "JORGENSEN" trade-mark.

Genuine "PONY" Clamps are designed, manufactured and guaranteed by us also. Style No. 50 "PONY" Clamp Fixtures are recommended for schools because they attach to ordinary ¾" pipe to make clamps of any desired length, providing low-cost, light, strong clamps for work of any size. Equipped with the finest and exclusive "Multiple Disc Clutch" holding device, which "zips" to position and stays put any place.

Write for No. 16 General Clamp Catalog

ADJUSTABLE CLAMP CO.
"The Clamp Folks"
424 N. Ashland Ave., CHICAGO



SHOP MATHEMATICS

By C. A. FELKER
Professor of Vocational Education, University of Toledo, Toledo, Ohio

Here is a specialized and advanced course in the practical application of mathematics for the high school boy who will more than likely be a machinist or toolmaker and wants to specialize in the trade.

$2.20

Answer book for SHOP MATHEMATICS (free on adoption), 30 cents.

Send for copy of this text for thirty days' study

The Bruce Publishing Company
710 Montgomery Bldg. Milwaukee, Wis.

SHELDON
Back Geared Screw Cutting PRECISION LATHES

A complete line of full steel, full weight 10", 11" and 12" Precision Lathes . . . bench, floor and pedestal types built to industrial machine tool standards and specifications. Rigid heavily braced, semi-steel beds with hand scraped ways—2 "V"-ways and 2 Flat Ways. Large hardened steel spindles, ground all over and individually fitted into hand scraped bearings. Each lathe has a full complement of attachments and accessories.

For schools—Type "U" Sheldon Lathes (illustrated). Full Bowl Headstock. 4 speed Roller Bearing V-Belt Motor Drive enclosed in cabinet leg. No belt shifting. Speed changes are instantaneous through clutches operated by outside levers. Student never touches belt or moving parts. Full Quick Change Gear Box (4 to 224 threads per inch). Longitudinal Worm Feed with Power Cross Feed, Thread Chasing Dial.

Write for Catalog and Prices
SHELDON MACHINE CO., INC.
4244 N. Knox Ave.
Chicago, U.S.A.

NEW AND IMPROVED LATHE MANUAL

This manual teaches beginners the proper care and operation of a lathe. Explains the grinding of cutters, modern lathe tools, how they set-up; methods of holding work and the performance of the basic lathe operations **50c**

Discount for schools and other quantity buyers.

FIRST and FINEST

HANDEE

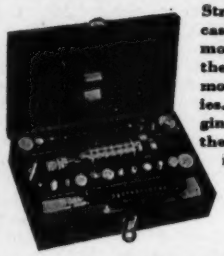
TOOL OF 1001 USES

Does precision work on metals, alloys, plastics, wood, horn, bone, glass, etc. Original tool of this type and the favorite today.

A WHOLE TOOLSHOP IN ONE HAND

Uses 300 accessories to grind, drill, polish, rout, cut, carve, sand, saw, sharpen, engrave. Plugs in any socket. Wt. 12 oz. 25,000 r.p.m. *$18.50* postpaid with 7 Accessories.

EVERY VOCATIONAL SCHOOL NEEDS THIS ULTRA DE LUXE SET



Strong, metal carrying case contains a DeLuxe model Handee and 45 of the most popular and most practical accessories. It's a good idea to begin with this set and then add accessories as needed.

Postpaid, *$25.00.*

ORDER on 10-DAYS MONEY-BACK TRIAL

FREE—64-page Catalog describes all Handee Products and their wide application in crafts and industry all over the world.

CHICAGO WHEEL & MFG. CO.

1101 W. Monroe Street Dept. IA Chicago, Illinois

. SILK SCREEN PROCESS .

Today's modern method for economically reproducing all manner of posters, signs, lettering, and displays in colors. For full particulars, write . . .

SILK SCREEN SUPPLIES, Inc.

33 Lafayette St. Brooklyn, N. Y.

AUDELS

MACHINISTS

AND TOOL MAKERS HANDY BOOK

JUST OUT! 4

A READY REFERENCE

Tells How to Operate and Set Up Lathes, Screw and Milling Machines, Shapers, Drill Presses and All Other Machine Tools.

A KEY TO SHOP PRACTICE

In All Branches. For Every Machinist, Toolmaker, Machine Operator, Draughtsman, Metal Worker, Mechanic and Student.

5 PRACTICAL BOOKS IN ONE! 00 FULLY ILLUSTRATED CHAPTERS

Covering 1—Modern Machine Shop Practice. 2—Blue Print Reading and How to Draw. 3—Calculations & Mathematics for Machinists. 4—Shop Physics. 5—How to Use the Slide Rule.

1600 PAGES FULLY ILLUSTRATED

ASK TO SEE IT

$4 Get this information for yourself. Mail coupon today. No obligation unless satisfied.

COMPLETE • PAY ONLY $1 A MO.

AUDEL, PUBLISHERS; 49 W. 23rd ST., NEW YORK

Mail AUDELS MACHINISTS & TOOLMAKERS HANDY BOOK, Price $4 on 7 Days Free Trial. If O. K. I will remit $1 in 7 days and $1 monthly until $4 is paid. Otherwise I will return it.

Name_____

Address_____

Occupation_____

Reference_____

(Continued from page 36A)

Price, $2. Published by Simmons-Boardman Publishing Corp., New York City.

This book is written for the homecraftsman. It contains good designs of modern furniture for the home, the garden, for the playroom, and for the use of the child.

There also is a chapter on toys and one on novelties.

References and Related Information — Vocational Guidance for Girls and Women

By Marguerite W. Zapoleon and Louise Moore. Paper, 162 pages. Price, 25 cents. Vocational Division Bulletin No. 214, Occupational Information and Guidance Series No. 6. Federal Security Agency, U. S. Office of Education, Washington, D. C.

The annotated references in this new bibliography include books, pamphlets, bulletins, and periodical articles on vocational guidance, training, occupations, and the like, written especially for and about girls and women during the period from January, 1935, through June, 1940. The references are given under the following headings: occupational information; occupational biographies and fiction; training opportunities; vocational guidance principles, programs, and practices; women's status with respect to work and education; surveys; and bibliographies.

Air Navigation

Prepared by E. Molloy. Part I — Cloth, 128 pages, illustrated. Price, $2.50. Part II — Cloth, 132 pages, illustrated. Price, $2.50. Published by Chemical Publishing Co., Inc., Brooklyn, N. Y.

This material was compiled by a panel of experts. Part I covers air pilotage and dead reckoning; maps and charts; flying with the aid of instruments; an introduction to astronomical air navigation; radio navigation; navigation of long flights over the sea; meteorology; and a summary of conditions governing grant of air navigators' licenses.

Part II treats of magnetic compasses and other types of direction indicators; causes of deviation in magnetic compasses and methods of correction; turning and acceleration errors in compasses; navigational calculators and accessories; drift sights, drift markings and ground-speed meters; practical notes on sextants; relative merits of ground and aircraft directional radio systems; course keeping by radio and gyro; the use of radio beams in approaching an airport; and night flying under normal conditions.

Plastics

By J. H. Dubois. Cloth, 295 pages, 5⅝ by 8½ in., illustrated. Published by American Technical Society, Chicago, Ill.

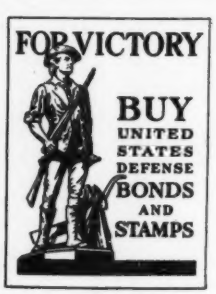
This book contains a clear and comprehensive discussion on the manufacture and use of the interesting material known as plastics.

The various types of plastics: phenolic; urea or amino; cellulose; acrylic, vinyl, and styrene; cast phenolic and protein; and other forms of plastics are all thoroughly explained.

The method of turning the plastics into different kinds of marketable products are also told in an interesting manner.

Occupational Guidance for Youth

By F. Lyman Tibbitts. Published by Harlow Publishing Corp., 217–223 North Harvey, Oklahoma City, Okla. Price, 25 cents.



Best for ALL Project Work!

Soft-Textured, Kiln-Dried

B-G LUMBER

It's EASY to Work! It's EASY to Sand!
It's EASY to Glue! It's EASY to Finish!

Speeds up the work in your classes—stimulates greater interest—improves craftsmanship. That's why it's first choice with schools in all 48 states. Send in your trial order NOW.

Call on B-G for advice and aid in YOUR Defense Training Program

BRODHEAD-GARRETT CO.

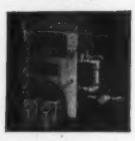
"Supplying Defense Training Needs to Schools in All 48 States"

CLEVELAND, OHIO

Heat Treating Furnaces and Equipment

FORGES—gas fired, no smoke or dirt. Sizes from the bench type at right to large floor models.

MELTERS—for aluminum, brass, lead, gold, etc., many sizes and types.



We also supply Ovens, Salt Baths, Complete Shop Tables — Blowpipes, Burners Etc.

American Gas Furnace Co.

Elizabeth, N. J.

TOOLS ALWAYS SHARP with PLURALITY OILSTONE TOOL GRINDERS

Now available in 3 sizes

No. 425 Plurality Sub Jr.
No. 450 Plurality Jr.
No. 475 Plurality

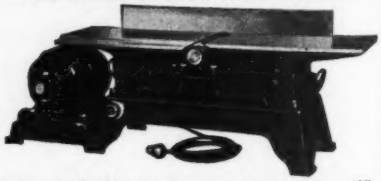
No. 450 Plurality Jr.

Grinding can be done on a cone, coarse or fine oilstone, leather stropping or emery wheels. Unit is compact, efficient, serviceable, easily accessible and has ball bearing direct motor drive. Especially guarded for school shop use. Details on request.

Mummert-Dixon Co. Hanover, Pa.

Originators and Pioneer Manufacturers of Oilstone Tool Grinders

PRACTICAL SCHOOL SHOP JOINTER



H and A 6" Jointer, extra long tables, 42" overall, rabbetting type, automatic safety guard adjustable tilting fence, three knife round safety head, ball bearing boxes, made entirely of sand cast iron parts, free of die castings, ½ H.P. single phase motor, 110 volt, starter, bench type as shown.....$102.00
Cast iron floor stand mounted..... 118.00

Send for large circular.

WOODWORKERS' TOOL WORKS

224 S. Jefferson Street Chicago, Illinois

New Books to Boost the Morale of Your SHOP LIBRARY

● ● ●

Just Out—

A new text giving the beginner a thorough, specific training in . . .

BLUEPRINT READING FOR THE METAL TRADES

W. A. DeVette and D. E. Kellogg, Instructors, Vocational Dept., Erie Public Schools, Erie, Pa.

Written especially to provide a practical textbook in one of the important wartime skills, this new book teaches the beginner to read blueprints for the machine trades and related occupations. Definite assignments and reading exercises make it practically self-teaching so the student can develop a high degree of efficiency.

142 pages, 59 plates, 63 figures, *$1.60*

YOU CAN WHITTLE AND CARVE

Franklin H. Gottshall and Amanda Watkins Hellum, Instructors, Martha Berry College, Mt. Berry, Ga.

The beginner is not only told how to carve in this book but also what to carve. Only a simple pocketknife and a small block of wood are needed to execute these attractive designs.

Illus., 96 pages, *$2.25*

INDIANCRAFT

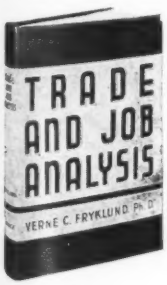
W. Ben. Hunt, author of INDIAN AND CAMP HANDICRAFT

More than forty-five projects of Indiancraft are completely described here. Each is not only authentic, but is full of boy appeal. Step-by-step directions on full-page plates drawn by the author-artist. Illus., 124 pages, *$2.75*

ELECTRICAL THINGS BOYS LIKE TO MAKE

Sherman R. Cook, Instructor, Industrial Arts, Lindblom High School, Chicago, Ill.

How to make thirty-three simple, workable electrical devices that delight the junior high school boy and give practical experience in making minor repairs. Illus., 202 pages, *$2.25*



Excellent Professional Aid

TRADE AND JOB ANALYSIS

Lt. Col. Verne C. Fryklund, Educational Director, Armored Force School, Fort Knox, Ky.

Shows teachers and teacher trainers how to organize all technical teaching tasks.

176 pages, *$1.75*

CREATIVE CRATE CRAFT

Paul V. Champion, author of BIRDHOUSES, Instructor, Industrial Arts, Elwood Public Schools, Elwood, Ind.

Saving supplies is the keynote of these thirty-eight attractive pieces of furniture made by the beginner from shipping containers.

Illus., 110 pages, *$1.50*

MASTER HOMECRAFT PROJECTS

George A. Raeth, Former Director, Trade and Industrial Education, Burbank Public Schools, Burbank, Calif.

This unusual woodworking book contains furniture of modern design which permits the student to spend a few hours making the simple hat rack or many weeks doing the complete bedroom set. Illus., 160 pages, *$2.00*

OPERATION OF COMMON WOODWORKING MACHINES

Herman Hjorth

Another Hjorth classic-to-be

Through illustrations and clear directions the author explains the efficient and safe operation of all the machines used in modern woodworking.

Illus., 176 pages, *$1.72*

ACCURATE HOME ESTIMATING

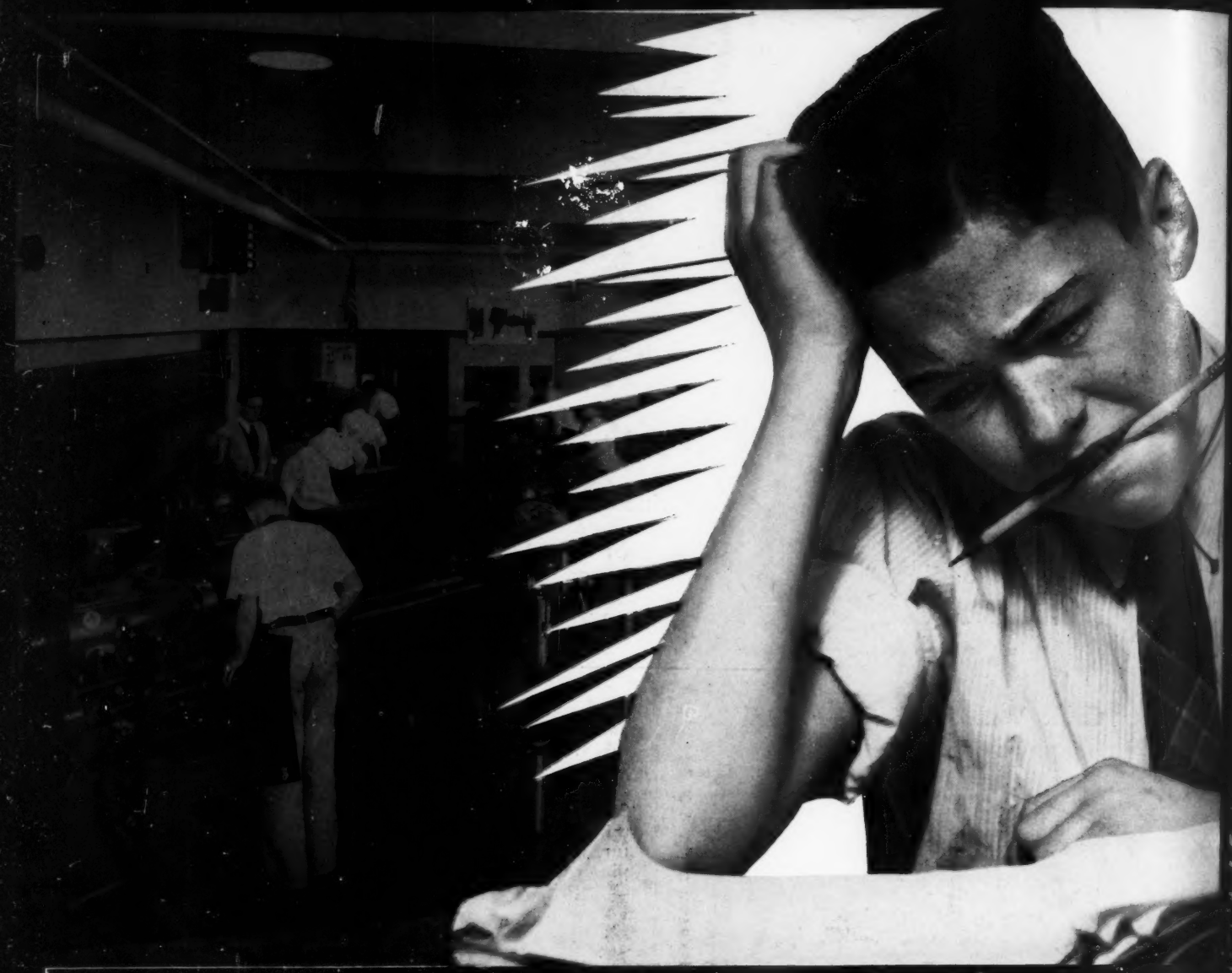
Thomas A. Roberts, Instructor, Masonry Trades, Milwaukee Vocational School, and Ruth Roberts, Milwaukee, Wis.

The standard methods of quickly and accurately estimating all of the approximate costs of home construction.

Illus., 286 pages, *$3.00*

Send for any of these books for five days' study

THE BRUCE PUBLISHING COMPANY, 710 Montgomery Building, Milwaukee, Wis.



WHO SAYS YOU'VE GOTTA BE 21 TO BE A MAN?

Lots of kids are ageing fast these days.

It's not that they think football is any less important, nor that beating it out at the corner juke joint has lost its appeal. It's just that an awful lot of level headed young fellows are finding that these are things to be sandwiched into a pretty tough schedule of learning to do a man's work — in a hurry.

In the work shops of America's high schools, trade schools, and colleges, LeBlond Super Regal Lathes are helping some of the finest instructors in the world mold boys into men. Maintaining their rugged dependable accuracy in the face of the faltering mistakes of beginners, Super Regals are teaching, swiftly and effectively, techniques that our fathers learned the hard way or never learned at all.

The R. K. LeBLOND MACHINE TOOL CO., CINCINNATI, OHIO
Largest Manufacturer of a Complete Line of Lathes

NEW YORK: 103 Lafayette St., Canal 6-5281

CHICAGO: 20 N. Wacker Dr., STA 5561

LeBLOND
CINCINNATI, OHIO
U.S.A.